FISCAL YEAR 1984 DEPARTMENT OF ENERGY AUTHORIZATION

HEARINGS

BEFORE THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

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FISCAL YEAR 1984 DEPARTMENT OF ENERGY AUTHORIZATION

TUESDAY, FEBRUARY 8, 1983

House of Representatives,
Committee on Science and Technology,
Washington, D.C.

The committee met, pursuant to call, at 10:30 a.m., in room 2318, Rayburn House Office Building, Hon. Don Fuqua (chairman) presiding.

The Chairman. The committee will be in order.

It is a pleasure today to welcome Secretary Hodel in his first appearance before the Committee on Science and Technology. Although the President's energy policy and his budget proposals for energy research and development have and will occasion much debate in these halls, I think that Don Hodel brings a welcome assurance of sound management and responsiveness to congressional intent.

Despite declining oil prices and the worldwide economic recession, I am convinced that our vulnerability to oil imports remains a central problem for this nation. I am equally convinced that Federal deficits do not mitigate the need for an active Federal role in the development of new alternatives for energy supply and demand.

In the last 2 years the committee, and the Congress as a whole, has come out on the side of a balanced energy policy. This means a strategic petroleum reserve to reduce our near-term vulnerability and a budget for research and development that pays adequate attention to all energy resources. Congress has also been committed to maintaining a corps of expert scientists and engineers so that we do not lose our international technology lead in all fields, from breeders to photovoltaics.

The responsible subcommittees once again will be looking thoroughly at the administration's continuing insistence on deep reductions in fossil, renewables, conservation, and related environmental technologies. The inclination of the Department to restrict the magnetic fusion program to an applied science activity will certainly be questioned.

Another area of great importance is the Department's implementation of the Nuclear Waste Policy Act of 1982, the first version of which was reported by this committee, and which was the most significant energy legislation passed by the 97th Congress.

Finally, I would like to mention something where I agree with the administration—fundamental science. The firm, emphatic increases in the basic energy sciences, high energy, and nuclear physics are welcome. They pay attention to the needs of all of our national laboratories and the many university users dependent on the large state of the art facilities which the laboratories provide. I suspect there may be questions on detail but not on the overall programmatic objectives.

Once again, we are very happy to have you here.

I would like to call on Mr. Winn, our ranking Republican Member, for any comments that he might wish to make.

Mr. **Winn**. Thank you, Mr. Chairman, for the opportunity to welcome Secretary Hodel.

It is my understanding that this is your first opportunity to testify before a House committee. I would say that you have started with the good guys first. The statement which you provided to the committee contains a considerable amount of information on administration policy and initiatives which we received last week from Dr. Keyworth, the Director of the Office of Science and Technology Policy.

I will not dwell on that material at length. However, I want to express my support for the additional money which you ha[illegible] requested for the high energy physics, nuclear physics, and [illegible]ic energy sciences programs. We all agree that this fundamental research is necessary if we are to go forward as a strong, inventive nation.

However, I do have some concern about funding levels. Over the past 2 years there have been dramatic cuts in solar, conservation, and fossil energy programs. My concern is this, Mr. Secretary: The scope of these programs changed very little during these cost-cutting activities. Therefore, we may be spreading a small amount of money over too wide an area, with the result that some programs are being inadequately funded, and that money is being thrown away.

I want to emphasize that I am not advocating that more money be spent. I just feel that it might be more appropriate to cut back on the scope at the same time that money is being reduced in some of these areas.

Another area of concern to me is the small amount of funding that is being provided to maintain and upgrade the Department's $8 billion capital account fund. We have never seen a number that represents anything near the depreciation rate of an asset of that size.

Again, I am glad that you could be with us today. We look forward to your testimony and discussion which will follow.

Thank you, Mr. Chairman.

The **Chairman**. Thank you, Mr. Winn.

Mr. Secretary, you may proceed.

I know you have a prepared statement. We will make the prepared statement, in its entirety, part of the record if you wish to summarize.

STATEMENT OF HON. DONALD PAUL HODEL, SECRETARY, DEPARTMENT OF ENERGY, ACCOMPANIED BY MARTHA HESSE, ASSISTANT SECRETARY FOR MANAGEMENT AND ADMINISTRATION, DOE, AND ELIZABETH SMEDLEY, ACTING DEPUTY CONTROLLER, OFFICE OF CONTROLLER, DOE

Secretary HODEL. Thank you, Mr. Chairman, I would like to do that. I would just like to hit some of the high points of my prepared statement and then move to the questions.

The overall levels of the budget are spelled out in that opening statement. Defense programs represent $6.8 billion out of the $11.9 billion total the Department requested. The strategic petroleum reserve amount is $742 million; general science is $645 million. Under energy, we have research and development projects which total about $2.2 billion. We have some energy production costs in there of about $871 million. We have nuclear waste activities of $3 to $7 million.

What I would like to highlight for the committee in this statement are the trends in the budget.

Within the area of energy R&D, the conservation proposal that we have requested this year in the fiscal year 1984 budget is 4½ times the amount of money that we requested for fiscal year 1983. Now, I want to be the first to say that I am very well aware of the fact that the committee and the Congress in fiscal year 1983 provided considerably more money than we are requesting in this budget. However, our current proposal includes a great deal more money than we requested in the fiscal year 1983 budget.

I am, at least, attempting to suggest that this is a trend toward providing greater balance in this budget and in the future. This is consistent with discussions I had with the Senate committee at the time of my confirmation hearing, when great concern was raised about the fact that, in its view, and I know this in this committee's view from conversations with you, we had a disproportionate amount of our budget for R&D in one category and not enough in these other categories.

I got on this budget train fairly late. It was a long way out of the station when I grabbed hold in November, but we did achieve some adjustments in these levels.

In the renewables area, the increase is 29 percent over what we asked for last year. In the fossil area, it is 27 percent over our fiscal year 1983 request. Still, both of those are well below the levels that the Congress provided in the continuing resolution. Again, I am well aware of that.

We have Energy Research Advisory Board reports that relate to a number of these areas, and we will need to do an increasingly good job of relating those recommendations to our budget. Those reports are partially, but not fully, integrated into this budget proposal. I think we can do a better job of that in the fiscal year 1985 budget proposal. It may be as a result of discussions with the committee when the Assistant Secretaries come forward and get into the details of the various proposals.

In the general science area, which you referred to in your opening statement, Mr. Chairman, there is an absolute increase in this request over the amount of money appropriated in the continuing resolution for fiscal year 1983. These additional funds are largely attributable to new initiatives which are set forth in the program to construct a linear collider at Stanford, to expand the national synchrotron light source at Brookhaven, to provide a national center for advanced materials at Lawrence-Berkeley Laboratory, and to provide increased support for university research programs, which we think is an important adjunct not only to the national laboratories, but to the activities of the Department.

A couple of items that are in this budget deserve special mention; one is the Clinch River breeder reactor. The Congress provided in the continuing resolution that it was our obligation to come back to Congress by March 15 with an analysis of how outside or additional funding could be provided which would relieve the Federal financial burden for that program.

I have been very open and candid in my remarks to any who asked on the subject of the Clinch River breeder reactor that, in my estimation, we must come up with some such source of funding or we cannot reasonably expect Congress to fund the program on the basis that it has been funded. Therefore, in this budget, where there is approximately $840-some million for nuclear energy activities, $270 million of that is directly related to the Clinch River breeder reactor project. Of the $272 million which is in the base breeder program, a portion of that is also related to activities that relate to Clinch River and would have to be reexamined in the event that we could not come up with some financing mechanism.

At the present time, there is an industry group which is meeting intensively, I believe, to identify things the industry can do to come back to us with a proposal with which we would feel comfortable with coming back to the Congress and saying, here is how we see a means of maintaining the breeder program.

It is probably important for me to say at this point, because I think there has been some misunderstanding, that I happen to believe that this nation is well-served to maintain movement across a broad range of scientific and technological activities. That, to me, includes the breeder reactor. Whether we can do that remains to be seen. But I want to make it clear that I have no personal hostility to the breeder program and would like to see us continue it.

What I do not know is whether we can come up with a mechanism to enable us to do that in a way which is satisfactory to the Congress.

Another issue which has recently surfaced and deserves comment is the effect of OPEC's inability to set quotas and prices. I have suggested that this puts an additional burden on the Department of Energy to highlight the importance of continuing conservation programs and renewable programs; that as a nation we ought not to conclude that, because we have some short-term change in price or supply, we can now lose interest in conservation and renewables.

It seems to me what we must do is provide at least the high level interest and support for conservation and renewable activities so that we can maintain the momentum that has been achieved there. In this regard, it seems to me this is not something where great sums of money are called for in addition to what we are suggesting but, rather, that I take, and we as an administration take, strong positions in support of maintenance of conservation and renewable activities.

I met with a number of organizations—conservation groups, and renewable groups—and I think we share a common concern that we not encourage Americans to conclude that, because there is a short-term drop in price, we should turn our backs on what should be long-term efforts for conservation and renewables.

Overall, it would be my hope to work with this committee, with the Congress, and with outside organizations in trying to achieve a broad basis for a new consensus on energy in the country. I believe that we have for too long as a nation torn ourselves apart over energy issues—do we need more, do we need less, do we need this form or that form? Much of it has been in the context of this instead of that, this rather than that.

It seems to me that if we can move toward a consensus, we could approach in a balanced way the need for energy. If we can approach a balanced energy mix which would include the whole spectrum—from conventional resources right on through the renewables and conservation as a resource—we would be providing this country with the best kind of situation for its energy future.

In order to do that, it seems to me we should work toward, and work with this committee particularly, trying to achieve some kind of core commitment to a level of scientific and technological activity. I have served in the past on the board of directors of the Electric Power Research Institute; while I was at the Bonneville Power Administration, I also supported, proposed, and maintained research programs.

I believe strongly that the worst thing one can do to a research program, which is usually—particularly basic research—a long-term program, is to up the funding one day and drop it the next, changing the course. If every 2 or 4 years or less, we keep changing the commitment of this country toward science and technology, we will have inadequate programs and inadequate scientists; and it seems to me we ought to be working away from that.

I recognize the problems that are created when we do not maintain a core commitment. I hope that we can work toward a bipartisan commitment which will endure after I am no longer in this job as well.

Thank you, Mr. Chairman.

[The prepared statement of Secretary Hodel follows:]

STATEMENT OF DONALD PAUL HODEL
SECRETARY OF ENERGY
BEFORE THE
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
FEBRUARY 8, 1983

Mr. Chairman, Members of the Committee, I appreciate the opportunity to discuss with you the FY 1984 budget request for the Department of Energy, and the energy policies of this Administration to which this budget is responsive.

Before presenting the details of the budget request, I would like to offer my perspective on energy and energy policy and describe the current energy situation.

ENERGY PERSPECTIVES

First, I believe that energy has an importance far beyond most commodities, because, directly and indirectly, energy is significant to every aspect of the U.S. economy. Domestic and international economic recovery and growth cannot take place without stable, reliable energy supplies that are available at a reasonable cost. Economic strength — and ultimately the strength and security of the free world — are dependent upon a purposeful energy policy that encourages efficient use of existing resources and timely development of technologies and resources for the future.

Another belief I hold very strongly is that overreliance on any one energy source is unwise, and that a balance among energy resources is needed. This Administration's energy policy seeks a balanced energy program that includes a full range of energy technologies which compete fairly in the free market. It is a policy that avoids overreliance on any one energy source and recognizes regional diversity in determining the optimum mix of energy supplies and patterns of energy use.

Finally, it is particularly important, I believe, to take note of energy conservation. Past supply disruptions and the impact of sudden price increases have led to increased investment in energy conservation. These investments have clearly demonstrated that conservation makes good business sense — and more importantly, that we must view conservation as a resource and not simply something we do for altruistic reasons.

These three principles—that energy is vital to a strong economy and, ultimately, to the strength of the Free World; that we must have a flexible and balanced approach to utilizing our energy resources; and that conservation should be viewed as an important energy resource—are beliefs I have held since my days as Administrator of the Bonneville Power Administration. These beliefs underlie the energy policies of the Reagan Administration and are embodied in the budget proposal I will present to you today.

THE CURRENT ENERGY SITUATION

As a Nation, we face a much more favorable energy situation than at any time during the past decade. In 1982, the United States produced about 90 percent of the energy it consumed, the highest level of energy self-reliance in almost ten years. Imported oil is down, both in absolute amount and as a percentage of consumption. This is a result of two heartening factors - an increase in domestic production since 1977, and a drop in domestic consumption, due in significant part to conservation practices in the face of increasing prices.

Moreover, the proportion of our oil imports coming from distant and potentially insecure Persian Gulf and North African sources has declined, and we have made more use of oil from nearby sources such as Mexico. Finally, since achievement of a better balance among various energy sources is a policy goal of this Administration, I am especially pleased to note that we have seen a significant change in the mix of fuels contributing to energy growth. Since 1973, virtually all of the energy growth has come from coal and nuclear power, whereas increased use of oil and natural gas fueled energy growth previously. This Nation has vast energy supplies and a growing capability to make use of all of them.

THE FEDERAL ROLE IN ENERGY

The Federal role in energy is one of fostering a climate that enhances national and international peace and security while assuring adequate and reliable energy supplies which are reasonably priced, environmentally acceptable, and efficiently used. Within this context, the Department of Energy has several specific goals which are reflected in our proposed budget for FY 1984 at levels which I believe to be appropriate in our current economic circumstances. These goals are:

- o Support of long-range basic research programs.
- o Conduct of energy-related applied research and technology development programs in areas that involve large, unpredictable and long-term risks, costs, or payoffs and therefore attract little or no private funding.
- o Foster the development and utilization of a wide range of energy resources including conservation, and solar and other renewables, in addition to conventional resources.
- o Manage programs and facilities for national defense in the areas of nuclear weapons, nuclear materials, and naval reactors.
- o Develop and manage energy emergency preparedness policies and programs.
- o Support U.S. international energy objectives and non-proliferation activities.
- o Provide useful, objective energy information.
- o Manage the Department efficiently and effectively.

BUDGET OVERVIEW

The FY 1984 budget request for the Department of Energy is $11.9 billion in budget authority, including $583 million in off-budget oil acquisition and transportation funds for the Strategic Petroleum Reserve. Anticipated outlays are $13.0 billion. The FY 1984 request represents a decrease of $933 million in budget authority from the levels appropriated in FY 1983. This decrease is the net effect of decreases in funding for Energy programs, the Strategic Petroleum Reserve, and Departmental Administration, offset in part by increases in Defense Activities and General Science.

Energy programs comprise about 30 percent of the Department's budget for FY 1984, approximately the same percentage as in the larger FY 1983 budget appropriated by Congress. The FY 1984 request continues the redirection of the Federal effort away from near-term technology demonstration in favor of longer-term, high-risk research and development, which has been a feature of this Administration's energy budget policy. Consistent with this policy, such longer term programs as Magnetic Fusion and Basic Energy Sciences show increases in FY 1984 over the level of FY 1983 appropriations. Fossil Energy, Conservation, and Solar and Other Renewable programs show reductions against the level of FY 1983 appropriations, reflecting a commitment to the support of longer-term technology base development activities rather than near-term product and process development that is better left to the private sector. Although our budget request in these technology areas is below the level of Congressional appropriations in FY 1983, it is higher than our FY 1983 budget request, and reflects a genuine attempt to accommodate certain Congressional concerns over the pace of our redirection.

I am pleased and very supportive of the budget's commitment to essential energy research and development. I believe we are making use of the taxpayers' dollars in the proper manner by applying those dollars where the need for Federal investments is indisputable, and resisting the temptation to support near-commercial technologies, where we might merely supplant funds the private sector could otherwise invest.

The Strategic Petroleum Reserve budget request is reduced significantly. This reduction does not signal a reversal of the Administration's support of the SPR as an essential element of protection against supply emergencies. It reflects overall budget requirements and an appreciation of the much improved world energy supply situation and the increased level of protection the SPR now provides as the result of our resolute development and fill practices. The Administration target continues to be the development of a 750 million barrel Strategic Petroleum Reserve.

The Departmental Administration funding request is reduced as a result of increased revenues and decreasing employment levels due primarily to the scaling-down of marginal programs.

The General Science program area is up sixteen percent over FY 1983, due primarily to utilization of a number of major new research facilities just now coming on line and acceleration of an important construction project.

Finally, Defense Activities represents over half of the total budget request for the Department in FY 1984. The request of almost $6.8 billion represents a nineteen percent increase from FY 1983, and reflects the Department's commitment to fulfill the requirements of the Department of Defense for nuclear weapons and materials production.

The budget we are proposing is presented in a format appropriate to the existing Department of Energy. However, the Administration believes that the nature of the Federal effort required to assist in meeting national energy objectives no longer requires a separate Cabinet-level agency devoted solely to energy.

I would now like to discuss the funding request for selected major program elements.

FOSSIL ENERGY

The United States has abundant domestic supplies of coal, petroleum, oil shale, and natural gas, and the role of the Department's Fossil Energy program is to help establish an adequate scientific and engineering knowledge base so that the private sector can apply new and improved technologies for making use of these vast resources. Consequently, the Department concentrates on applied research and technology development which industry could not be expected to undertake on its own, while leaving the commercial introduction of developed technologies to the private sector.

The FY 1984 budget request for fossil energy programs is $138 million, which is to be partially offset by $44 million in prior year balances. This constitutes a considerable reduction from the FY 1983 appropriation of $311 million, but is approximately 27 percent higher than our request in FY 1983. I believe our request is fully adequate to fulfill the proper Federal role and build upon past Federal investments in fossil technology. Approximately $110 million of the request is for programs designed to better utilize the Nation's coal reserves. The major funding element within the coal program is the Advanced Research and Technology Development program, which is to receive almost 30 percent of the overall funding. The remaining funds are applied in a balanced manner to liquefaction and gasification technologies, coal preparation, fuel cells, combustion systems and heat engine research.

CONSERVATION

The aim of the Energy Conservation Research program is to conduct basic research in fields of scientific inquiry where new knowledge can expand the generic technology base underlying energy conservation. This will support private sector efforts to develop ways to make more efficient use of available energy and to facilitate use of nonpetroleum energy sources. The FY 1984 budget for Conservation activities, including Electric Energy Systems and Energy Storage programs, is $101 million, almost $80 million more than the Department's FY 1983 request. Electric Energy Systems and Energy Storage together account for $27 million. The $74 million requested in the Conservation appropriation account is divided among the various end-use sectors the research effort supports, such as Buildings and Community Systems, Industrial Energy Conservation, and Transportation.

In FY 1984, the major focus to the Buildings area will be on performing technology base research and development that will allow the private sector to improve the energy efficiency of buildings, insulation, heat pumps, and furnaces. The Industrial program will concentrate on combustion efficiency improvements, waste heat recuperators, industrial heat pumps, conversion of industrial waste to fuels and feedstocks, energy efficient separation systems, and process control systems. In the Transportation area, major efforts will continue in heat engine development, development of electric vehicle battery and propulsion systems, alternative fuels utilization, and development of advanced materials.

The Department's budget requests $3 million for the management resources required to perform an orderly closeout of the State and Local conservation grants programs. We believe that the Administration should continue to assist the needy to adjust to high energy prices through the Low Income Home Energy Assistance Program administered by the Department of Health and Human Services.

SOLAR AND OTHER RENEWABLES

Solar and Other Renewable Energy resources offer the potential for significant energy contributions over the long term. In addition to direct solar energy technologies, such as photovoltaics and solar thermal, this energy research category includes biomass, wind, and geothermal energy technologies. The budget request in FY 1984 is $102 million, approximately 29 percent above our budget request in FY 1983.

A number of solar applications are competitive today in certain regions. Consequently, the Department's programs will concentrate on technology base development in certain areas, such as advanced photovoltaics, where the investment risks are high and industry cannot be expected to undertake completely the long-term research necessary to bring the technologies to the point of commercial introduction.

The largest program element within the Solar research area is Photovoltaics, for which the budget request is $33 million. The thrust of the photovoltaics program will be on establishing the scientific feasibility of advance photovoltaic materials, because a five-fold improvement in efficiency/cost is required for sustained market penetration.

Other major elements of the budget request include Solar Thermal, Biomass, and Geothermal. Our $22 million program in Solar Thermal will emphasize materials research, central receiver technology, and heat transfer systems analyses. The Biomass program will concentrate on research and development on thermochemical and biochemical conversion processes capable of producing solid, liquid and gaseous fuels from organic material, and will investigate methods of increasing algal biomass feedstocks through species screening and genetic engineering. The Biomass budget request is $17 million.

The Geothermal budget request of $14 million supports a technology base development program which can be used by the private sector for future development of geothermal energy sites.

GENERAL SCIENCE

The programs included in the General Science appropriation support basic research into the fundamental structure and behavior of matter. Much of this work has no direct or immediate application to energy technologies, and it is carried out as an endeavor for the advancement of the frontiers of science.

The budget request for FY 1984 is $645 million, a sixteen percent increase over the FY 1983 figure of $554 million. The increase is due to the expanded research opportunities provided by the availability of major new facilities in the High Energy Physics and Nuclear Physics programs. In High Energy Physics, FY 1984 will see the first full year of operation of the Energy Saver superconducting synchrotron at Fermilab. Also at Fermilab, construction will continue on the Tevatron I and II construction projects, and construction of the SLAC Linear Collider will be accelerated at the Stanford Linear Accelerator facility.

The Nuclear Physics program will make use of new facilities at the Lawrence Berkeley, Oak Ridge, and Argonne National Laboratories and the Bates Electron Accelerator Laboratory. Also, Van de Graaf accelerators at Yale and the University of Washington will be upgraded.

BASIC ENERGY SCIENCES

The Basic Energy Sciences program seeks to provide fundamental scientific knowledge relevant to energy exploration, production, conversion, conservation, and use. The proposed budget for FY 1984 is $350 million, approximately 24 percent above the amount appropriated in FY 1983. A major portion of the increase is associated with an advanced materials research initiative which includes two major construction projects and related research and equipment. The new construction projects are a National Center for Advanced Materials at Lawrence Berkeley Laboratory and expansion of the research capability of the National Synchrotron Light Source at the Brookhaven National Laboratory.

MAGNETIC FUSION

Successful development of fusion energy would ultimately provide access to an inexpensive and essentially inexhaustible domestic energy resource base. The objective of the Magnetic Fusion Energy program is to develop an economically competitive technology in an environmentally sound manner.

Two confinement concepts, the tokamak and the tandem mirror, are developed to the point that both are ready to attempt production of reactor-grade plasmas. In FY 1983-84, several major new fusion facilities will begin operations: the Large Coil Project, the Tritium System Test Assembly, and the Tokamak Fusion Test Reactor (TFTR). In 1986, the TFTR will be the first fusion devise in the world to attempt to demonstrate energy breakeven.

The FY 1984 budget request of $467 million will provide the necessary support for continuing the development of the two leading fusion concepts, tokamaks and tandem mirrors, and for limited support of experiments on alternate confinement concepts, including the Reverse Field Pinch and Compact Toroids. Another significant element of the FY 1984 budget strategy is to maximize coordination with foreign fusion programs, including those in Japan, West Germany, and the USSR, and provide limited funding to continue design and development activities on the Fusion Materials Irradiation Test Facility in anticipation that an international agreement can be reached on joint construction funding.

NUCLEAR FISSION

The Department's Nuclear Fission activities are designed to provide the technological base to revitalize industry's efforts to continue the development of nuclear power as an economic and environmentally acceptable source of baseload electric power. The program includes research on conventional reactors as well as breeder reactor systems, and concentrates also on nuclear waste and fuel reprocessing technologies. The FY 1984 budget request is $848 million.

The largest element in the Nuclear Fission budget is Breeder Reactor Systems. The request for Breeder Reactor Systems is $603 million, of which $270 million is for the Clinch River Breeder Reactor (CRBR) project. Funding for the CRBR was provided for FY 1983 subject to certain restrictions on its use, and with a requirement for a vigorous exploration of possible methods of reducing Federal budget requirements for the CRBR or alternative projects. I am fully aware of the depth of Congressional concern, and I intend to fulfill my pledge to seek alternative methods of financing this costly but extremely valuable project. If we are unable to produce an alternative funding proposal, I have indicated that we cannot expect the Congress to fund our FY 1984 budget request.

Assuming the CRBR proceeds as planned, site preparation activities will be essentially completed in FY 1983. In FY 1984, plant design will be virtually completed and construction of the plant foundations will begin upon receipt of authorization from the Nuclear Regulatory Commission.

In addition to the CRBR, a $272 million breeder base technology program is proposed to develop components, fuels, core designs, engineering systems, and materials suitable for breeder reactors, and to operate a number of highly specialized facilities which test components, safety procedures, and system operations. If we do not proceed with the CRBR, we will have to evaluate which of these efforts must continue and at what levels.

NUCLEAR WASTE DISPOSAL ACTIVITIES

One of the great achievements of the 97th Congress was the passage of the Nuclear Waste Policy Act of 1982 on December 20, 1982. This legislation, signed into law by the President on January 7, 1983, establishes a Fund to finance activities related to development, construction and operation of a commercial high-level waste repository and development of the Monitored Retrievable Storage option.

The Fund is to be financed by fees paid by nuclear utilities. The budget request in FY 1984 is $307 million, while fee collections are expected to total $448 million. Revenues are to offset required budget authority, with revenues in excess of requirements being retained in the Fund as offsets to future needs.

Efforts in the Waste Disposal program are directed toward site selection, licensing, construction, and operation of mined geologic repositories, and will include activities such as site characterization and exploratory shaft development. To ensure that the requirements of the Waste Bill are fully understood and acted upon as promptly as possible, I have detailed a number of Department of Energy employees from the Policy and Planning organization to a special task group for this purpose.

The program is now focusing on four main geographic areas: the basalt flows underlying the Hanford Site in Washington, the tuffs underlying Yucca Mountain at the Nevada Test Site, salt domes in the Gulf Coast States, and bedded salt formations in Texas and Utah. Nationwide screening of additional sites in other geologic media, such as the granitic rocks of the Lake Superior and Appalachian region, will continue.

URANIUM ENRICHMENT

The FY 1984 budget request for uranium enrichment activities is $2,240 million. This includes funding requirements for the three major elements of the program: gaseous diffusion operations and support ($1,485 million); gas centrifuge operations and support ($681 million); and advanced isotope separation ($73 million). Funds requested for gaseous diffusion operations are primarly for electric power required for the production of 12.1 million separative work units (SWU) of enriched product. The costs of the program are completely offset by revenues from the sale of enriched uranium.

The FY 1984 budget also requests funds for the Portsmouth Gas Centrifuge Enrichment Plant (GCEP). The importance of the gas centrifuge technology is that it uses less than five percent of the power required by the gaseous diffusion technology, and can therefore provide enrichment services at a significantly lower cost. Lowering production costs is essential if the United States is to remain competitive in the world market for enrichment services.

The Advanced Isotope Separation program has the goal of developing the Atomic Vapor Laser Isotope Separation process to the point where it can provide for the production of enriched uranium at significantly reduced cost. The FY 1984 budget request will initiate evaluation of engineering issues and system reliability, for possible future construction and operation of a Development/Demonstration Module in the late 1980's.

STRATEGIC PETROLEUM RESERVE

The budget request for the Strategic Petroleum Reserve (SPR) is $742 million. This figure is well below the FY 1983 appropriation. The off-budget request for oil acquisition and transportation is $583 million. In FY 1983, our currently planned average daily fill rate will be very nearly 220,000 barrels per day. During FY 1984, the fill rate would be 145,000 barrels per day. The budget will permit a cumulative fill of 410 million barrels by the end of FY 1984. We are requesting $142 million for facilities development, to be divided between Phase II and non-phase-specific activities. Phase II, the expansion of three existing storage sites, will add 290 million barrels of storage capacity. Non-phase specific activities include ongoing operations and maintenance, systems reliability improvements and safety upgrading.

Phase III development at Bryan Mound and West Hackberry will continue from funding in FY 1983 to be made available in FY 1984. The FY 1983 budget will continue Big Hill site acquisition activities and completion of detailed design work. However, a decision on whether to proceed with construction activities at the Big Hill site will be reanalyzed within the context of the FY 1985 budget.

The SPR budget request reflects in the first instance the Administration's efforts to trim the federal budget wherever it is prudent to do so. I am aware of the bipartisan Congressional commitment—which is shared fully by the Administration—to enhancement of national security and protection against petroleum supply emergencies by, among other measures, providing for rapid fill of the Strategic Petroleum Reserve. I need not and will not take a back seat to anybody in my resolve that Federal energy policies and programs be designed and administered to contribute optimally to our Nation's economic and strategic security.

Overall budget considerations have compelled the Administration to propose reductions in a variety of programs, including but not limited to SPR, which we wish we could have avoided. Although outlays for SPR petroleum purchases are off-budget, they affect Federal borrowing and economic activity the same as on-budget spending.

If the Department were to fill at a 220,000 barrel per day rate during FY 1984, total program costs would be increased by more than the direct additional outlay of some $900 million for oil purchases and transportation. Interim storage, at an estimated cost ranging from over $1 to $5 per barrel per year, would be required for approximately 10 million barrels. Moreover, purchases of an additional 27.4 million barrels of oil in FY 1984 (representing the difference between fill rates of 220,000 and 145,000 barrels per day) would have to be made with borrowed money. One cannot ignore the cost of borrowing those funds. Based on current forecasts, purchases of oil made today with borrowed money would require outlays in excess of those required to purchase the same amount of oil in FY 1985.

The budget request for FY 1984 also takes into account the dramatically improved world oil market. When plans for the SPR were developed five years ago, they were based on projected 1985 imports of as much as 11 million barrels per day. Current Department forecasts project United States imports of only about 6 million barrels per day in 1985, up to a 45 percent reduction, and actual net imports in 1982 were at a level of only 4.2 million barrels per day. Arab OPEC imports to this country have declined from a 1979 peak of 3.2 million barrels per day to about 900,000 barrels per day in 1982, and now constitute only 21 percent of our total net imports. Unlike the situations in 1973 and 1979, there now is substantial excess production capacity in the free world, including OPEC nations. These factors tend to reduce both the impacts of unexpected supply disruptions and the incentive to use oil embargoes as weapons in international politics.

Moreover, the United States and its allies are much better prepared today to deal effectively with disruptions in oil supplies. The SPR now holds 300 million barrels, nearly three times as much oil as there was at the beginning of this Administration. Counterproductive controls have been abolished, so that any subsequent disruption would not be accompanied by the market distortions we experienced in the past.

The selection of any given fill rate represents a judgment as to what is prudent in the circumstances. Measured in terms of the approximately 6 million barrels per day of imports projected by DOE for 1985, the fill rate contemplated by the Energy Emergency Preparedness Act without regard to availability of funds would provide 83 days of coverage against such imports. Under the presently proposed fill rates, there would be 74 days of such coverage--a difference of only 9 days.

That difference is not so great, in our view, to warrant walking away from the substantial budget savings sought by today's proposal. Moreover, we, in conjunction with our sister agencies, intend to monitor the world oil situation--in terms of both the likelihood of future supply disruptions and probable future price levels--so that we may take advantage of future opportunities to acquire oil at potentially lower costs and, when appropriate, rapidly fill available SPR capacity.

The SPR budget request represents a balanced approach of reducing present costs of the program in light of overall budget considerations while, at the same time, continuing at a reasonable rate the growing capability of SPR to provide economic and strategic security to the Nation.

DEFENSE ACTIVITIES

The budget request for Defense Activities is $6.8 billion, an increase of $1.1 billion over FY 1983. The budget is higher in every major category, with the major increases occurring in Weapons Activities, Materials Production, Defense Waste, and Naval Reactors.

Within Weapons Activities, the Research, Development and Testing program is up $195 million. This program generates new concepts for nuclear weapons and applies them to Department of Defense requirements. Another major program element, Production and Surveillance, is up $436 million over FY 1983 because of increased Department of Defense requirements for production of new nuclear weapons for the stockpile, improvement of selected older weapons in the stockpile, and surveillance and maintenance of existing weapons, as approved by the President in the Nuclear Weapons Stockpile Memorandum.

The weapons in production include the B61-3 Bomb, B61-4 Bomb, W76 TRIDENT Warhead, W79 8-inch Artillery Fired Atomic Projectile Warhead, W80-0 Sea Launched Cruise Missile Warhead, W80-1 Air Launched Cruise Missile Warhead, B-83 Bomb, W84 Ground Launched Cruise Missile Warhead and the W85 Pershing II Warhead. Also included are pre-delivery production efforts which will be conducted in FY 1984 for the W81 Standard Missile 2, W82 155mm Artillery Fired Atomic Projectile, W87 MX, and Sentry Warheads. Funding is also requested to maintain and rehabilitate faciliities throughout the weapons production complex.

The Materials Production program, which supports the production of nuclear materials for national security programs, is up $283 million over FY 1983. The FY 1984 budget request provides funds for the first full year of operation of the L Reactor at Savannah River after completion in FY 1983 of upgrade activities started in FY 1981. Also, the budget request provides funds to complete reactivation and begin operation of the PUREX processing plant at Richland and to continue the Facilities Restoration program.

The Defense Waste and Byproducts Management program will begin construction of the Defense Waste Processing Facility at Savannah River, and will continue the program of transferring high-level waste from single-shell tanks at Savannah River and Hanford into new double-shell tanks. Also, efforts will continue on the preparation of transuranic wastes at various Department of Energy sites for shipment to the Waste Isolation Pilot Plant under construction near Carlsbad, New Mexico.

Mr. Chairman, I believe that the budget I have just summarized will permit us to perform those energy functions which are the unique responsibility of the Federal government. The Department of Energy is fully prepared to work with the Congress in the coming months to ensure that the course charted for us in FY 1984 represents a true consensus.

The **CHAIRMAN**. Mr. Secretary, you are starting off on a very good footing. We may have a love-in. The comments particularly about changing direction in research is something that has been of great concern to us in this committee for some time. When programs are well thought out, constructive, they go through the process—programs don't just fall out of the sky, they go through a lot of procedures, and even get approval by OMB and all the congressional committees, and the departments, and then somebody new comes along and says no, this is not the way to go. It does create a very inefficient method of conducting research. And I am very pleased to hear you say that, because your Department has a major role in research programs. I am very pleased to see your support for that.

I have several questions, but in the interest of time we will try to expedite this. I will withhold my questions and submit them in writing to you and go on with the other members.

Mr. Roe.

Mr. **ROE**. Thank you, Mr. Chairman.

I, too, want to welcome the distinguished Secretary who is joining us for his initial presentation this morning. I have had a chance to review your testimony. I think it is excellent. I share some of the encomiums expressed by the chairman.

I, too, have a series of questions to ask, but I think I would rather submit them to you in writing because I don't expect you to have them at your fingertips at this point.

There is one area that concerns me, however, and I do want to call it to your attention. I communicated with you just recently, 3 or 4 days ago, so I have not had a response as yet, which I did not expect immediately. But the low-level radiation program is of extreme interest to the State of New Jersey, and I would say to most of our industrial States.

You have a program known as the formerly utilized sites remedial action program. We are having a problem in the removal of thorium, going back to earlier testing and work done in our area. I noted that the budget appendix briefly mentions these programs. The budget figures, however, are included under the nuclear figures line item along with such large programs as the Clinch River which you referred to.

Can you give us some idea as to what funding is allocated and what kind of activity is taking place in that program?

Secretary **HODEL**. The total figure for the remedial action program with regard to low-level waste is a request for $58 million in the 1984 budget, which compares to a continuing resolution amount of $48 million, a $10 million increase, and to apply that directly to the formerly utilized sites portion, the request this year is at a $12 million level, which compares to the continuing resolution level of $11.7 million. It represents an increase, and I am informed it is consistent with the schedules which are called for in the low-level waste cleanup program.

Mr. **ROE**. Are there any funds allocated or any methodology you have for any emergency that may exist in that kind of program—any flexibility?

Secretary **HODEL**. I have no personal knowledge at this time as to what we have in the way of emergency capability, if one should arise. My intuitive reaction is that, within a budget of this type, we would have considerable flexibility in the event of an emergency to allocate funds to handle it, if it were clear that it was an emergency and how we should proceed.

Mr. ROE. Well, I want to thank you, Mr. Chairman, and Mr. Secretary. I won't pursue this further.

I have a series of questions I will submit to you, because I need some additional information in this area.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. Roe.

Mr. Winn.

Mr. WINN. Thank you. I do have questions to submit in writing.

I do have one question which I know is of great interest to a lot of people, Mr. Secretary. What is your position on a business energy tax credit act that would extend the termination date for the tax incentives on renewable energy resources? Do you have a position on that yet?

Secretary HODEL. So far as I know, the administration does not have a position, Congressman. Therefore, I believe I am free to have my own position as of this time. If it were my choice, I would——

Mr. WINN. You want that to be sure to appear in the record.

Secretary HODEL. I think that needs to be in the record regarding that position.

If it were my choice, I would favor extension of the business energy tax credits. It seems to me that is precisely consistent with the point I made in my opening summary with regard to the importance of continuing emphasis on these programs, even though some people may say, "Well, today it is not as urgent as it was."

Mr. WINN. That is scheduled to expire in 1985. I wonder if there has been some discussion with the administration on that subject yet.

Secretary HODEL. It would be my reaction that although there are undoubtedly some discussions, a little way down the road may be a more favorable atmosphere in which to discuss that extension. But I am just assuming that at the present time.

Mr. WINN. I think you will find a lot of support for that from this committee.

Secretary HODEL. I have, in my meetings with organizations that support extension of that tax credit, asked them to give me some information which would be useful in representing that point of view and pointing out the economic benefits and consequences of such a tax credit. I think there is quite a good case that can be made, although I do not have it in my hand at the present time.

Mr. WINN. Prior to your arrival at the Department of Energy, DOE had completed a report on utilities. When will that report be released? Is there any time schedule for that yet?

Secretary HODEL. There is no time schedule for the release. That report was one which became very well traveled in my briefcase, as I carried it home and back, but didn't get a chance to review it. Actually, there was no time pressure on it, and I had other things with time pressure on them.

I finally did review the report and suggested that several adjustments needed to be made in the format of the report. I have as recently as the last week suggested that in view of the comments I have received from really a wide range of interested parties, we need to do some kind of communication process.

I don't know quite how to characterize it yet. I have asked for some suggestions as to how we can take that draft report and review it with interested groups before we go forward and release it.

Some of the conclusions in the report, if taken out of context, could be quite controversial, even within the utility industry, which I think had substantial input to the consultants.

It seems to me that we have to have a better awareness of the problems and a better understanding on the part of constituent groups.

Mr. WINN. You have a problem when you start circularizing even a rough draft of that. It comes out in the press sometimes and in the trade journal as the gospel before you have even made a final decision or even had some discussions on it. So I would warn you, don't—I know you are aware of it, but don't get caught in the middle on that thing until you are ready to release it, because there are a lot of people that are interested in it.

Secretary HODEL. I hear you, Congressman, and I wish I knew how to resolve that issue. I am torn between the concern that it may appear we are trying to spring something on people, which I would not desire to do, and on the other hand, by even asking the question, being accused of doing something that really is in the informational stage.

I will probably have that problem as long as I am Secretary. But we are going to try to get some comments on the basic thrust of that report before we go forward to the Cabinet Council with any recommendations.

Mr. WINN. Thank you, Mr. Secretary.

Let me just say, Mr. Chairman, you and I both appreciate the opportunity from time to time to meet with the Secretary in off-the-record meetings so that he can update us and tell us what is going on in his shop over there. I think that is a welcome addition to your leadership. Thank you very much.

The CHAIRMAN. Thank you, Mr. Winn.

Mr. Brown.

Mr. BROWN. Thank you, Mr. Chairman.

Mr. Secretary, did you indicate whether or not the report which I think you referred to with regard to alternative financing on Clinch River, whether or not the scheduled date of March 15 is likely to be kept on that report?

Secretary HODEL. It is my intention to meet that date. I have every reason to believe at the moment that we will be able to do so. We do expect the report back from the industry utility group, at least 2, maybe 3 weeks in advance of that date, which gives us time to review it, process it, analyze it, and present a report to the Congress by March 15.

Mr. BROWN. I want to explore with you for just a moment the situation on Clinch River. I don't think it is any secret to you that the matter has been debated in an atmosphere of controversy.

On the last go-round, this committee and the House rejected the funding of Clinch River. The Senate, by a one-vote margin, in two separate votes, kept it in. And that is reflected in the continuing resolution.

Now, your overall budget for the Department is one that I think is reasonable and probably would not be too unsatisfactory to a majority of the Congress, except for the one little item of that $270 million, or whatever the figure is, for Clinch River. If that amount of money were taken and redistributed over the renewable technologies, I think you would have a budget, at least for the energy part of your budget, which would have acceptability.

My question to you is: What is your view as to the effect of making this change on our national energy posture?

Do you think it would be damaging to it, or do you think you could live with it, or do you think—I hesitate to ask you if you think it would be an improvement, because I doubt if you want to make that comment. But I would like to have you make a comment or two about that type of a change, keeping the overall figure approximately what you have, but readjusting that rather small amount.

Secretary Hodel. First of all, I need to deal with the Clinch River portion of the question. I believe that the committee working on that issue will come forward with at least one, maybe several, responsible alternatives which we can look at as a means of continuing the Clinch River project. The funding level that is in this budget is well below the funding level requested by that programmatic portion of the Department.

But assuming that there were money freed up for whatever reason in that category of our budget, whether Clinch River continued at a lower level or was discontinued, and assuming that we would have the necessary funds to commence the shutdown costs, which are quite considerable, the question then is, what about the reallocation of the money that becomes available?

My answer has to be that we feel we have presented here a budget which has been carefully put together by the Department of Energy budget staff, and the program officers, over the course of the year. I had a few weeks to look at it as it was in the final stages of preparation when I became Secretary of Energy.

We think that we would desire to defend the budget as it is presented in these areas; but hopefully, because of the effort we have made to increase the funding in conservation and renewables and fossil, we would be able to talk about, first of all, our priorities within the amount we have requested, and, second, what additional high priority items we perhaps have left out of that budget in the view of this committee.

I would not be able to provide a blanket answer that, yes, we ought to just pour that money across the other programs, but we would hope to deal with each item on specific merits.

Mr. Brown. Well, I am sure that we will continue to do that as we have in the past. But despite the very laudatory remarks you have made about the importance of conservation and renewables, a very quick glance at the budget figure shows that conservation is about 25 percent of what it was 2 years ago, and geothermal is about 10 percent, and solar is about 15 percent, and fossil is about 15 percent. And those do not bear out the laudatory words that you have uttered about the importance of these programs.

Now, we understand fiscal stringency and so on. But we think maybe a little give in those areas might be reasonable under the circumstances, since you have spoken so highly of the importance of these programs.

Let me ask you one additional question.

There were two items reported in the scientific press last year, two experiments indicating a possible breakthrough in the production of hydrogen from water by solar energy in the presence of catalysts. Is there any means in your department to keep abreast of developments of this sort, and to arrange for, we will say, a little extra effort if there really is a possibility of a breakthrough in that area?

I am using that as a general example of scientific breakthroughs.

Secretary HODEL. I have to make an assumption, and that is yes, there is a means based on the fact that when I have raised questions about that kind of thing, though not that specific project, I find that we have knowledgeable people in the Department who keep abreast of those events. Within the budgets that we have, we do have a considerable amount of research activity going on frequently in related or similar activities. I would expect without too much difficulty, where there appeared to be great promise in some area, we could adapt and adjust and at least keep abreast of it and identify where we should be augmenting if that is required.

Mr. BROWN. Well, I note that you do provide for increases in the basic science budget which would accommodate opportunities of that sort. I commend you for that, and I hope you will keep abreast of such opportunities.

Secretary HODEL. Thank you.

The CHAIRMAN. Thank you.

Mr. McGrath?

Mr. MCGRATH. Thank you, Mr. Chairman.

Mr. Secretary, I want to welcome you to the committee today, and also commend you for your excellent opening statement.

I am extremely pleased with the tone and candor of your statement, and especially by the fact that you have indicated a willingness to work with us in matters relating to the Department of Energy.

I wish you the best of luck in your new job, and I must again state that I am very pleased with your selection for this important position.

Mr. Chairman, may I ask unanimous consent to revise and extend my remarks, and also, as yourself, Mr. Winn, and Mr. Roe, to ask permission to have specific questions answered in writing?

The CHAIRMAN. Without objection.

Mr. MCGRATH. At the risk of seeming somewhat parochial, I must ask you about the Department's plans now and for the 1984 budget and in the future for the Isabelle.

The CHAIRMAN. It is not called that any more.

Secretary HODEL. The budget does not include money for the completion of construction of the Isabelle project, which is about 90 percent completed. We had a series of problems, I am advised, which called for a discontinuation of construction money of that project. We have remedied the leadership problems at the laboratory. I think that is moving forward effectively now.

We are in the process, I understand, of reviewing the question of whether that project should be completed or revised at Brookhaven. In this budget, there is no money for construction.

Mr. McGRATH. On another topic: I have a resource recovery plant in my district which I know the chairman has in the State of Florida also operated by the same company. It has been shut down for the past year and a half now because of an emission standard problem. When I sought to get some relief for the local government that is sending the garbage to the plant, I received communication from both your Department and EPA, and seemingly there is a dual responsibility.

I just want to see how you perceive your responsibility in that resource recovery process.

Secretary HODEL. I am sorry, Congressman, I don't have a perception at this stage. I did not know that there was an overlap, and I don't know the scope of that problem.

Mr. McGRATH. We will ask that question in writing.

I have no further questions, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. McGrath.

Mr. Glickman?

Mr. GLICKMAN. Thank you.

Secretary Hodel, it is a pleasure to welcome you today. I know this afternoon you are going to be dealing with the issue of natural gas prices, an issue near and dear to my heart. I am hopeful we can perhaps this year reach a point where we can begin to work on moderating those prices which are affecting our consumers. I would like to ask you a base question.

By your statements today, are you implicitly endorsing the continuation of the Department of Energy? That is, is the administration now reconciled to the fact that we will not abolish the Department of Energy?

Secretary HODEL. No.

I would like to expand that answer, if I may.

Mr. GLICKMAN. Sure.

Secretary HODEL. Early on my arrival at the Department, I met with employees I knew were concerned about the status of the Department, and I tried to make the point that I believe the administration concurs that the activities going on at the Department of Energy today are activities that need to and will be continued by the Federal Government. We remain persuaded, although we have not been particularly persuasive in that point of view, that we could improve the overall situation if we were able to merge these functions of the Department of Energy largely with the Department of Commerce.

Now, I also go on to say, whenever I am asked this question, that I recognize what the temper of Congress is with regard to this matter, and the administration is well aware of that. At the present time, we have not come forward with proposed legislation to accomplish that merger.

Mr. GLICKMAN. Do you intend to do so?

Secretary HODEL. I would desire to do so. I realize I am not answering the gentleman's question, because at this moment I cannot honestly do more than to say that I would desire to do so.

Mr. **Glickman**. Well, I would tell you I would desire that if you do so it would not pass. I think it is important to have such a department. But I think that is perhaps less relevant than the issue that the programs, now that you are an operating Department of Energy, actually operate.

One of the things I have found during the past couple of years, particularly with your predecessor and with some of the folks who are at the Assistant Secretary level, particularly in the conservation area, as well as others, that there has been a recalcitrance in taking the money Congress provided, and the President signed in appropriations bills, and spending it on those kinds of things that the Congress and the President had agreed to when the bills have passed and been signed into law.

I would hope, irrespective of your philosophical desire to see the Department ended and the programs transferred out, that as long as the Department does operate that you and your folks don't show that kind of recalcitrance, that there are programs that are important that you have acknowledged in your statement, and that you do your best to spend those monies in the way Congress intended.

Secretary **Hodel**. Congressman, I feel an overriding obligation to meet my obligation as Secretary to spend the money that is appropriated.

You will notice in the budget document that, in listing the fiscal year 1984 requests, we do not list any rescission proposals in fiscal year 1983. In all fairness and candor, I need to make the point that I am reviewing the programs in the fiscal year 1983 continuing resolution, and will continue to do so. If it is my concern that we may not be spending money wisely, or in an appropriate program under that continuing resolution, it would be my desire to come to the Congress and express my concern and attempt to work out the appropriate treatment. If there is concurrence, presumably it would be a rescission or deferral. If there is not a concurrence, if the Congress is not inclined to go in that direction, obviously I feel I am committed to spend it.

Further, if this Committee or its members encounter representatives of the Department of Energy whom you feel are recalcitrant in attempting to carry out our responsibilities, I would appreciate being advised of that. It is, again, my conviction that in a government position we have a higher obligation and a public service obligation which need to be fulfilled, and that does not include being cantankerous or recalcitrant in the performance of our duties.

Mr. **Glickman**. I appreciate your response.

Mr. Chairman, I will have a couple of specific questions to submit in writing on transportation programs. But I would like to close with a specific matter.

Your 1984 request contains the first-year funding for a new advanced materials development facility at Oak Ridge. Also, it contains funding for a new materials center at the Lawrence-Berkeley Laboratories at the University of California. I am told by people with NASA, who do a lot of materials work themselves, they knew nothing about the proposal for the new materials center at Oak Ridge.

My point is, we have about $1 billion of materials work being done which is very important for the future of American reindustrialization, and I would hope that there is a proper coordination of the issue. I mention this to you because I think it could become a problem.

Secretary **Hodel**. I appreciate that. That is new information to me. I can assure you that by the time our Director of Energy Research arrives here, he will be thoroughly briefed on that process and be able to respond to that concern, because I would share that concern with you.

Mr. **Glickman**. I thank you.

Thank you, Mr. Chairman.

The **Chairman**. Mr. Skeen?

Mr. **Skeen**. Thank you, Mr. Chairman.

Mr. Secretary, I want to add my commendation to those of the other members on this panel.

It is refreshing to see someone in the energy field today who has now decided that we can take leadership of a department that has been born again, since that is a phrase we love around this place.

I particularly am interested in your comments and repeated comments about balanced energy programs. And I think this is something that has been lacking, because no one knew where energy was going. We have had a shotgun approach at every kind of energy aspect over the last several years, and I, too, feel this is the kind of approach that we need, one that is based on the attitude that we are a country that depends on its energy base, and that they are not necessarly the ones that are the most popular at that particular time, but they are all essential if we are going to survive.

In relation to that, I would like to ask you particularly, since we passed the high-level Nuclear Waste Policy Act—and I think that was a significant step, and an integral and very important part of that was the nuclear waste trust fund—how do you feel about establishment of a trust fund that covers the entire nuclear fuel cycle from enrichment through processing, and of course including waste disposal?

Secretary **Hodel**. Congressman, that is a real mouthful to try to deal with.

Mr. **Skeen**. I had trouble with it, too.

Secretary **Hodel**. I am not sure that I can adequately, off the top of my head, analyze all of the potential impacts and problems. As a matter of policy, we generally prefer not to establish separate trust funds and separate accounts, because of a number of problems that that creates. Over a period of time, sometimes the purposes and the needs of the country change.

If it is not general fund money, we now have ongoing funds. Secondarily, if it builds up greater than is needed in the particular area, there are those, both in Congress and outside Congress, who cast covetous eyes on that money. So we don't generally favor those kinds of trust funds. But I would like to look at the overall implications of it before giving you an answer which said I did or did not favor it in this case.

Mr. **Skeen**. Well, Mr. Secretary, I would agree with you on earmarking funds of that kind in energy programs. I think it is a very dangerous precedent, because priorities shift. However, just in general, I think that one thing we have overlooked in this committee and in our approach to energy applications, its entire generation and so on, has been we have picked at the nuclear problem phase by phase. We have not talked about total cycling of the nuclear cycle. We have avoided it because it has been unpopular, and becoming more of an emotional than a rational issue for some time. But it is one we are going to have to approach some day.

I just have a feeling that other than earmarking funds, we should give some priority to full cycle nuclear production that includes the entire problem rather than just various facets of this one energy approach. And I do appreciate your response. I agree with you, I would hate to see the earmarking of funds laying in slack water areas rather than using an approach that is flexible enough to give us the attention we need to our priorities and the funding we need.

Thank you very much.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. Skeen.

Mr. Volkmer?

Mr. VOLKMER. Thank you, Mr. Chairman.

Mr. Secretary, I, too, wish to congratulate you on your testimony. But I, like other members, have some reservations from what I see in the budget and what I hear testified to.

I would like to go back a little bit to what Mr. Glickman started out with, and your answer to it as far as rescissions.

When I analyze the budget for 1983 and what we gave you to spend, and then I see what we see in 1984, especially in the renewables and fossil energy fields, do you intend to plan your year for 1984 on those figures that are contained in the 1984 budget request?

Secretary HODEL. Yes. We prepare our fiscal year 1984 plan based on the budget submission. But as you well know, we are well aware of the adjustments that are sometimes made to proposals for budget. I think, in doing that planning, our target would be what is in our proposed budget; but we responsibly try to remain flexible until we find out what Congress provides in the way of funding.

Mr. VOLKMER. In other words, you will not anticipate that this will be the budget at this time as programs are being implemented right now, correct?

Secretary HODEL. As we implement the programs in fiscal year 1983, we will be implementing them in accordance with the fiscal year 1983 budget.

Mr. VOLKMER. But are you holding up on those right now, waiting to see what Congress is going to do for 1984?

Secretary HODEL. I am not aware of any programs in which we do that. I have to qualify my answer, because it is entirely possible that, if we expect Congress will be supporting a budget request which calls for a different level of activity, we should be making the net adjustments in 1983.

I would think the issue then becomes, do we expect Congress to support our request for 1984 in that category or not?

Mr. VOLKMER. Let's go back. We can see the prior year's request in these fields, et cetera, and we will find that the Congress did add to what you had requested.

Secretary HODEL. I have noticed that.

Mr. **Volkmer**. And I notice down here in Department Administration, you have a 35-percent reduction for funds. That, too, would probably follow the same line, would it not, to await the congressional action on that rather than starting to plan on that as of now? Are you planning a reduction-in-force as of now, as of October 1?

Secretary **Hodel**. I do not know of reduction-in-force plans. That does not mean there are not some percolating. But I don't know that there are reduction-in-force plans in order to try to meet the fiscal year 1984 levels. I don't believe that would be appropriate at this stage.

Mr. **Volkmer**. But you can see as I see a severe problem here in total planning, because you are coming up with one thing, the Congress is saying another, and we have timeframes that are involved in implementing programs at the same time, waiting to see what Congress is going to do. You probably won't know until May or June.

Secretary **Hodel**. Congressman, it is a very difficult planning process whenever the budget levels that are proposed differ from those which have been received in the past, and we don't know what the future holds. We are not unaccustomed to having that problem. I think we have generally managed to deal with it appropriately without violating the obligation to spend the funds that are appropriated.

Mr. **Volkmer**. I would like to commend you, too, on your philosophy on these programs, such as conservation. I can well remember your predecessor saying words to the effect, I won't quote, but to the effect the best conservation programs are created when energy costs go up. In other words, as energy costs go up conservation goes into effect. That has severe implications on a lot of people in this country. Your philosophy is not that. I mean that that should be the only R&D base.

Secretary **Hodel**. No, my philosophy is not the philosophy which you have characterized there.

Mr. **Volkmer**. Thank you.

One other thing. I would like to know the status, if you can give it to me—if not, another time—of the Elmo Bumpy Torus program.

Secretary **Hodel**. The recollection I have is that that project is——

Mr. **Volkmer**. Delayed by some technical problems. Can we anticipate we will have a resolution of that?

Secretary **Hodel**. There is no funding for the project in the 1984 budget. But the basic physics program which supports it will be continued, so that a decision can be made later as to what has to be done there.

Mr. **Volkmer**. But as far as any construction, this is put basically on hold?

Secretary **Hodel**. It is operating on design funds only at this stage.

Mr. **Volkmer**. All right.

Thank you, Mr. Chairman.

The **Chairman**. Thank you, Mr. Volkmer.

Mr. Bateman?

Mr. **Bateman**. Thank you, Mr. Chairman.

Mr. Secretary, the witnesses who have preceded you in these posture hearings indicated concurrence that there is a national priority for further basic research in the area of high energy physics. And I note in your remarks, in your printed text, that you too have addressed the subject of high energy physics.

Looking at your prepared remarks, you indicate a budget request for fiscal year 1984 including increases over the 1983 figure and the amount of it. Then you go on to point out that these funds are increased in view of the first full year of operation of the energy saver superconducting cyclotron at the Fermi Laboratory and other construction at that laboratory, on the Tevatron I and II projects, and construction of the SLAC linear collider at the Stanford linear accelerator.

Do you envision any additional laboratory facility in the field of high energy physics coming onstream or being needed in the coming fiscal year?

Secretary HODEL. I don't know whether the word "laboratory" applies, but we do visualize physical construction of additional facilities under these initiatives. But frankly, I don't know whether I could characterize them as laboratories or not. But there would be machinery, and a center for advanced materials and the like that would be constructed.

Mr. BATEMAN. Would your terminology include perhaps an electronic accelerator as a part of our enhancement of our research capability in high energy physics?

Secretary HODEL. Yes. We are receiving proposals now for an electron accelerator which will be evaluated by a panel, and there are a number of proposals that I am sure you are aware of as to how and where that should best be done. That is accounted for in this budget. I don't know whether we have construction, but I suspect it is design work that would be involved in the fiscal year 1984 budget.

Mr. BATEMAN. I would like, if I may, to reserve the right to submit some further inquiries in terms of this specific subject, which I certainly didn't expect the Secretary to be totally conversant with in detail.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. Bateman.

Mr. Nelson?

Mr. NELSON. Good morning, Mr. Secretary.

Secretary HODEL. Good morning.

Mr. NELSON. What are your alternative methods for financing the Clinch River?

Secretary HODEL. We presently have at work a utility and energy industry committee, task force if you will, which is seeking to identify what alternatives they can support. Obviously, the primary source of funding other than the Federal Government would have to come from the energy industry and, particularly, the nuclear portion of it.

We are expecting them to report back to us before long with a proposal or set of proposals. At that time we will look at it to see whether we can go along with what is proposed and make our report to the Congress by March 15.

At this point, I don't have a proposal, because any proposal that I would come up with, which would involve additional funding on the part of the industry or utilities, would simply be a pie-in-the-sky opinion on my part as to whether they would or would not accept that.

Mr. NELSON. If the Congress refused to fund the extension at Clinch River, there is a possibility of its continuation through private financing?

Secretary HODEL. I have actually stated it almost in reverse order, that unless there is some effort to increase the amount of private financing or to take over responsibility, or some alternative which I presently cannot identify, it is my expectation it would be very difficult to persuade Congress to continue to fund Clinch River. I have been very outspoken about that.

As I said to the committee earlier, that does not in any way mean I am not a supporter of Clinch River or a breeder program, but I just think it is the reality today.

Mr. NELSON. Let's talk about SPRO, the strategic petroleum reserve.

Since we have a lessening of the price, because of less demand primarily, all disarray in OPEC, why not go and purchase a good bit of that oil at the lower price now and next year until we get hit with another crisis, a shortage, and the price goes right back up and escalates, and we at that time are forced, with all of the possibilities that could happen if we don't have a reserve, forced to fill at the maximum rate possible?

Secretary HODEL. Congressman, I can assure you that and many other related questions have been asked and debated at length within the Department. We are in fact continuing to fill at a relatively high rate.

As you know, at the present time the spot market price has dropped substantially, although the official prices for oil have not yet dropped in the international market. I am advised that, at the present time there is an apparent holding back in market acquisition, obviously anticipating further price drops, or maybe I should say actual price drops.

Now, the official price is not the price at which purchases can be made today; the spot market price is below that level. Obviously, the market anticipates further drops in the price.

In making that kind of analysis, we look at several things; one is, do we have available storage? If we don't, it increases our price per year of the oil between $1.20 and $1.80 per barrel, depending on what storage we have available for each year we have to store it in interim storage.

[The material follows:]

The $1.20—$1.80 cost per barrel is, of course, on the low side, and represents the minimum increased cost for interim storage. The actual range is from $1.00—$5.00 per barrel, depending on a number of factors, including type of storage, location of storage, length of time in storage, and special government requirements such as security.

Secretary HODEL. Second, again depending on the price and what the long-term trend of the price is, an investment today, or this year, or in the 1984 period has to be discounted for the storage, the upfront cost.

I am not an economist, so I have to repeat my perceptions of what economists tell me. But they tell me that, if the price were to drop $2, $3, or $4 a barrel, if we bought that oil this year, within 3 or 4 years the savings would have been eaten up by additional interest, discount charges. So there is a weighing that has to go on.

Now in this particular budget——

Mr. NELSON. May I interrupt you a second and just say that that is making an assumption that the oil prices will continue to stay soft, that the availability of all the oil that we want will continue there.

I would just urge for your consideration and this Congress likewise will consider the fact, to remember 1973, and then again 1979, and recognizing how unstable that portion of the world is in the Persian Gulf region, an incident could set off immediate panic buying, the escalation of the price, hoarding, and immediately throw us back into the mentality that we found ourselves in in 1979, which is to try to start filling SPRO as rapidly as possible so that we can insulate ourselves, both financially and militarily, from dependence on that foreign oil that we found ourselves in.

Secretary HODEL. Congressman, we have come a long way from where we were in 1979 in several ways.

First of all—and I need to be very careful what I say here, because the last time I tried to say this I was quoted in a way which led to all kinds of consternation—we are far less dependent upon oil from the Middle East than we previously were. I don't mean to suggest that they are not strategically important to us, or that it is not an important supply. But we are not in the same ratio dependent upon them as we were.

Mr. NELSON. That is correct. But the free world still is very dependent.

Secretary HODEL. Yes; the free world understands, and the International Energy Agency understands, and accords on oil supply protection have done an excellent job of building up reserves compared to where we were even in 1979.

You will find, I believe, each of the nations that is signatory to those agreements is well in excess of the 90-day projected requirement. In this country, if we look at the IEA definition of what we need to protect against, we have several hundred days' supply.

The reality is, as you have clearly stated, anything can happen. I think for a wide range of possible actions, activities that could hurt, the strategic petroleum reserve has taken on a new importance, in view of the 300 million barrels supply, which is going up at the rate of 220,000 barrels a day during fiscal year 1983.

And where that leaves us is, if we had a problem, depending upon the magnitude of the problem, we are in a position with the strategic petroleum reserve essentially to replace for an extended period most any conceivable level of interruption; and the risk of an embargo is nowhere near what it was simply because of the excess capacity in the market today. We simply don't have the situation that existed in 1973 and 1979.

So I am not suggesting that we are backing off. I emphasize in my statement we still intend to fill the strategic petroleum reserve to the 750-million-barrel level, although I think you must continue to evaluate whether that is too high or too low. But we are continuing to move, and the budget proposal here that we have would result at the end of fiscal year 1984, in an inventory in excess of 400 million barrels in the strategic petroleum reserve, and about 28 million barrels less than if we filled at the higher rate.

But I understand there is considerable concern, and I am sure we will have further opportunity to discuss it.

The CHAIRMAN. Thank you, Mr. Nelson.

Mr. McCandless?

Mr. McCANDLESS. Thank you, Mr. Chairman.

On page 7, Mr. Secretary, of your prepared remarks, I will paraphrase it, under nuclear fission you talk about the revitalization of the industry's efforts to continue the development of nuclear power as an economic and environmentally acceptable source of baseload electric power. And in your budget you have also a line item for figures R&D.

My concern is one of the breeder reactor concepts and the fact that the European economic community seems to have overtaken us in the vacuum created in the United States and is currently going at a rather fast pace of development, not only for purposes of export as a means of generating revenues, but also that there are actually plants on line that use breeder reactors in the European community.

My concern is one of the United States losing its national technological independence in this field, and the balance of trade and domestic employment that could develop from this type of industry, as an export industry as well as possibly augmenting other more conventional types of electric power generation.

Would you have some comments on this as the Secretary that would be a person responsible for research and development and hopefully the pushing of such technology?

Secretary HODEL. The reason I indicated in my opening summary that I think we need a core commitment to science and technology, basic research, is because we do find ourselves today in a situation where, as I am briefed on issue after issue of technology, I am told that other nations somewhere in the world are moving ahead of the United States, or are in danger of moving ahead of the United States. We have prided ourselves I think correctly, for years in being in the forefront of technology. That has been a tremendous boost to American industry and enterprise, and it has meant jobs and a relatively high standard of living for the United States. It is a matter of concern to me, as it is to the administration that we find the problems in that overall international arena.

The countervailing problem, obviously, is that there is not enough money in our budget projections to do all of the things that appear to be good ideas. We need to make some evaluation.

We get part way down the road with a project like the Clinch River breeder reactor, which is, and was, in my estimation, an important step toward a commercial breeder, and it is the source and the cornerstone of American technology in that area, and we find ourselves in a position where, because of changing circumstances and changing political conditions and changing budget circumstances it is impossible, or very, very difficult—at least at this point it is very difficult and it remains to be seen how difficult—to keep that project alive and on track. If we lose that project, it makes it very difficult to figure how we go to the next level of technology.

The French jumped, as you know, from the Phenix to the Super-Phenix and thought they could move to a commercial level breeder. They established a commercial technology, but it is not economical at that level. They are now working with Japan and the United Kingdom and with us in discussions to identify what additional work can be done to make that a more economical project.

If you succeed in doing that, you have established a French technology as the lead, and you have exactly the situation you have identified. But I am talking only about the breeder. That is also true in a host of other issues, in magnetohydrodynamics, for example.

It is true, I am told, the risk exists with the solar technologies, especially photovoltaics, and the like.

Obviously I have given you a long answer. But I don't have an answer to the problem. It seems to me that it is one of those issues on which we ought to be striving to attain some broader national consensus. Today the problem is, you cannot start any long-range high-cost project in this country that involves Federal involvement and have any certainty that you can finish it or, if you finish it, that you will be permitted to operate it.

With that kind of uncertainty, the private sector has not only no incentive but tremendous disincentives to act.

Mr. McCANDLESS. The concern I have is that we have reached a point in the cycle of nuclear energy where major governmental expenditures, not just the private sector but major governmental expenditures, beginning back with the original bombs, and to have this find its way into other nations' bases of industry for purposes of exporting under peaceful means I find very difficult to accept.

I appreciate the comments of the Secretary. Thank you.

The CHAIRMAN. Thank you.

Mr. MacKay?

Mr. MACKAY. Mr. Secretary, you just made a statement about our policy and its apparent self-defeating aspects, its instability.

In the area of energy conservation and research on industrial conservation, and more energy-efficient buildings, are you not part of that problem? Have you not now, by cutting back, created a major disincentive for private sector research to continue?

Secretary HODEL. I don't know that we have created a major disincentive for private research to continue. I was concerned that you were going to ask me if I didn't recognize that, by the way we have adjusted our budget, we have not had an impact on the stability of the programs within the Department.

Mr. MACKAY. I think that is going to be my next question.

Secretary HODEL. Let me answer your last question first.

Yes, I am concerned about that, I am aware of it. I have become acutely aware of it in the various meetings and discussions I have had with groups that are concerned about various programs within the Department. I don't have a sense at that point within the budget constraints that we have to that part.

With regard to the industry incentives, it seems to me that we can continue to help create industry incentives, among them through the tax incentives, but also highlighting the continuing importance of conservation and renewables. I think that, in fact, there are people in this country who conduct themselves partly based on what they believe is in the national interest as well as their own local personal economic interest.

I think we must emphasize that we see a continuing need and a long-term benefit to this society from conservation and renewables which will help encourage industrial activity. I would like to continue to do that.

I have met with representatives of renewable energy industries to talk to them about what I can do to help them stimulate activity in that area.

Mr. MacKay. And so we could expect then that your approach as the manager of this program would be one that would not continue the direction of making budget cuts, inducing "instability" as you put it, in the area of renewable resources?

Secretary Hodel. Congressman, at this point the most I can offer as an indicator of my intentions is to reference what we requested a year ago compared to what we are requesting this year. In doing so, I constantly have to remind myself and others that I recognize those amounts still remain below what the Congress appropriated for fiscal year 1983. But I think that we are at least attempting to move in the direction where we can sit down with representatives of this committee and with organizations concerned about our expenditures and identify areas in which we can make a meaningful contribution.

Mr. MacKay. Then let me just ask one other question.

Your Energy Research Advisory Board released a report in January of this year which raised concerns about research management and it stated in part that disruption and lack of certainty about budgets, changes in personnel, and inability to plan for budgets that may reasonably be expected have all combined to make an effective energy conservation R&D program extremely difficult to administer.

Do you agree with that comment?

Secretary Hodel. I agree with that.

Mr. MacKay. And is it then your statement that you intend to take steps to try to minimize that?

Secretary Hodel. I intend to try to take those steps, yes.

I would hope we will look back a year from now and say we have made some real progress in doing that. I was briefed by the chairman of the committee that prepared that report, and they have some specific proposals as to what they would think would be useful. I cannot represent that we are prepared to come forward with any or all of them yet, but I certainly am intrigued by some of their suggestions.

Mr. MacKay. Thank you.

Mr. Chandler?

Mr. McCurdy. Mr. Chairman, I ask unanimous consent to submit some questions, specific questions in writing to the Secretary for later response.

The Chairman. Without objection.

Mr. Chandler. Mr. Secretary, I want to follow up—Mr. McCandless asked part of my question on Clinch River. I want to go beyond that.

I really agree with the point that you made that there are such uncertainties for the private sector, many of them having nothing to do with the potential of the technology but more with the politics of it, that it makes very uncertain the return on an investment on something especially as controversial as breeder technology. So I wanted to direct my question to a point that you made in your testimony.

I very much agree with your point on page 2 about the Federal role in energy being that this ought to be where the private sector is very uncertain about any return and obviously breaking new ground in technology. But then on page 7 you said, after commenting on the congressional mandate that the Department find private investors to participate in CRBR, "If we are unable to produce an alternative funding proposal, I have indicated that we cannot expect the Congress to fund our fiscal year 1984 budget request."

I am just concerned that perhaps there may be a conflict between the two statements there. I personally would be reassured to know that there may still be a chance that we go ahead with this kind of technology, even though it may look to the private sector at this point not certain enough that they would want to participate.

Secretary HODEL. Congressman, I would like to be where you would like me to be, but I have trouble getting there at the present time. I think it is clear how I feel about the program, but my assessment of the realities is what leads to the statement in my opening remarks.

The position I really think I need to maintain at this point, and one I can with some comfort, is that we have some very excellent people from the utility and manufacturing industry working hard at finding a solution which will permit me to come to the Congress with a viable proposal. I think, at this stage, I am going to hold that as my touchstone and hope that we will continue.

The broader question is the one I raised earlier and the one you are now commenting on about what this means to technology, is a matter of concern. It is simply illustrative of the problem we encounter in program after program, and as one of the other Congressmen has asked, in some ways when we make the budget we are part of that problem.

Mr. CHANDLER. And I understand you to be stating then that you feel reasonably confident at this time there will be private sector participation in the project?

Secretary HODEL. I believe they will come forward with an honest effort which we can look on with considerable approval and I hope the committee will be able to do likewise.

Mr. CHANDLER. Thank you. My compliments to your testimony.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. Chandler.

Mr. Valentine?

Mr. VALENTINE. Thank you, Mr. Chairman.

Mr. Secretary, one of the queries I believe was alluded to was the problem of OPEC and its oil pricing policies, how that affects not only the United States but the entire free world. And I would like to ask you, sir, if there are significant cooperative efforts which involve this country and our overseas friends, such as Japan, West Germany, and Great Britain, to develop synthetic fuels, and if you can comment on that, and if these efforts involve funding from these countries or if we just cooperate and use entirely money which comes from the United States?

Secretary HODEL. Congressman, I would like to answer from my recollection; and if it turns out I am not recalling this correctly, I would like to be able to follow up with a response to you which is more accurate.

But first of all, we have a major effort through the Synthetic Fuels Corporation within the United States. As you know, they have a request for proposals out right now for five or six plants on a guaranteed price and loan basis.

In addition, it is my understanding that there is a substantial amount of communication and actual joint effort in a project with, and here—I believe it is Japan and I don't know the other participant, I believe there are three participants—which is ongoing. So I think it is at an active level, not just a talking level with those other countries.

Mr. VALENTINE. Are you able to say, Mr. Secretary, whether that involves or will involve a significant amount of money from, say, Japan and/or are we expected to continue with what appears to have been the situation in the past, and use our funds to develop synthetic fuels that they would eventually benefit from?

Secretary HODEL. Again, I will have to respond more fully in writing.

My recollection is that the project we are talking about is one in which there is equal sharing between the partners, so that it would be a third and a third and a third. That is my understanding of the project. I will have to verify it.

[The material follows:]

The Department of Energy is actively participating with the Federal Republic of Germany in a joint project to develop an improved catalytic process for converting methanol, which can be obtained from coal, to gasoline. There are three participants—the Department of Energy, the Germany Federal Research Ministry, and an industrial consortium including firms from both countries. Each of the participants contributes one-third of the $30,000,000 total cost, so the Department's share at current foreign exchange rates will be about $10,000,000 over a five-year period.

Mr. VALENTINE. I don't have any further questions. Thank you very much. I think you have done a very good job for your first time.

The CHAIRMAN. Thank you, Mr. Valentine.

Mrs. Schneider?

Mrs. SCHNEIDER. Mr. Hodel, I am very appreciative of your willingness to take a second look at the Clinch River project and to work with the Congress in resolving the discrepancy.

I would like to ask you if you could tell us specifically who are some of the people that are part of that industry group that you referred to that will be coming up with an alternative financing plan.

Secretary HODEL. The chairman of the group is Gordon Corey, the retired chief financial officer of Commonwealth Edison. I am sorry. I don't have that list at my fingertips. It also includes Wally Benke who is with Commonwealth at the present time and has been chairman of the group on the Clinch River reactor

Also included are people from manufacturers of nuclear plant components.

Mrs. **Schneider**. Well, the composition of that committee is rather curious to me, because those are the very people who have been lobbying this body for the financing of the Clinch River project. And I am concerned that if and when the report does come forward, I wonder how Congress will respond to it if it appears that the proposals being made are being made by a fox who is in charge of the henhouse.

Secretary **Hodel**. I don't see it as that kind of proposal, if I may say. It seems to me that the people who have been lobbying hardest for the project are the ones precisely who ought to be on the committee that tries to find a way to provide the necessary funding to keep it alive, which is what this committee is charted with doing—not with selling the project to Congress, but rather to finding a way to fund it.

So we wanted people on there who were enthusiastic for the breeder and willing to struggle hard to find a way to fund it. That is why it is important that I continue to make plain what my belief is regarding what will happen if they are not successful.

I think it is important that is not suggested that anything less than a real effort would be sufficient or that we would turn around and come back to this committee and simply try to continue the past history.

Mrs. **Schneider**. OK. We will be looking enthusiastically toward that report.

Is the GAO also going to be doing a study to do an update, current analysis?

Secretary **Hodel**. I do not know. I don't recall having been told that GAO is or is not studying it.

Mrs. **Schneider**. In the midseventies, DOE produced a cost-benefit analysis on the Clinch River project. I wonder if you have access to any update now, and is it in-house or perhaps one that the GAO might be producing?

Secretary **Hodel**. I am not aware of having seen or been told about an updated cost-benefit analysis. It would not surprise me to find it has been done as part of this process, because, clearly, one of the things that a group will have to look at is what is the potential energy benefit of the project.

Once you have done the testing, the 5 years of testing, which is the Federal benefit from it, then how much energy can it produce, over what period of time and at what price? Presumably, that gets into the cost-benefit questions.

Mrs. **Schneider**. Right. Might it not be a good idea for you to recommend that such a study be done?

Secretary **Hodel**. I think what we need to do first is see where people are coming with their proposals. It may be we don't have to do a cost-benefit analysis if the proposal is so lousy it is not worth pursuing; or, if the proposal is so great, it may very well be we have to have one.

Mrs. **Schneider**. Moving over to your comments on conservation, I am aware you have met with different conservation and renewable energy representatives, and I commend you in developing a more constructive dialog with those entities. You certainly deserve our congratulations.

I would like to ask you some specific questions about the budget. As we know, when one puts their money where their mouth is, that is a clear reflection of what our policy or determinations are in energy.

I am concerned that in 1984 the request is $74 million for conservation. And that is compared to the fiscal 1983 appropriation of $414 million. Last year's DOE request, true, was only $22 million. So you can sit here and say you are asking for increases. But the thing that concerns me is perhaps we here in Congress could be spending a whole lot of time spinning our wheels when, in fact, you ask for only $74 million and we come up with $414 million.

The same is true in the various solar and renewable requests: $102 million is less than half the $252 million that had been appropriated by the Congress.

And the same thing with photovoltaics. It is half of the $55 million that was appropriated by Congress.

So I wonder if there might be some recurring of your budget proposals.

Secretary HODEL. The figure I have used on conservation was $102 million. It probably is what we count in that list that makes the difference between the $74 million figure which you identified and the $102 million. It is important, in looking at the conservation portion of the budget, to split that between the weatherization funding, which is a $255 million item in the fiscal year 1983 budget, and the remainder, which is about $163 million that is really conservation R&D.

Again, I don't try to prove too much by my argument. But in looking at the $102 million and comparing it to the $163 million, which is the R&D component, my hope was that we would not only have illustrated that we were serious about trying to be responsive in the conservation area, but we also could then debate two things. One, what priorities have we established in that $102 million, and two, which ones the committee feels we ought to have had rather than what we did.

Mrs. SCHNEIDER. But Mr. Secretary, I am concerned in that the $102 million has two new line items, one being electric storage and electric systems. And those account for, I believe, a significant portion of that $102 million.

Secretary HODEL. That is correct. They also were components in the 1983 appropriation. So that, in making the comparison to the $414 million, the comparison to be complete is $414 million to $102 million. And I back out the $255 million on the weatherization program in terms of comparing what we are doing on conservation research, with what the Congress had approved in 1983.

Mrs. SCHNEIDER. OK. I guess my time is up. I thank you very much.

I, too, Mr. Chairman, have one more question I would like to submit in writing, if I may.

Mr. FUQUA. Without objection.

The CHAIRMAN. Mr. Durbin?

Mr. DURBIN. Thank you.

The hour is late, I will try to be very brief.

My interest is in fossil energy research, particularly in coal. I have seen—and I believe that coal is one of our most abundant domestic energy resources—this administration in your budget continue to beat a steady retreat when it comes to fossil energy research and coal research. I would like to ask you whether you believe that we can count on sufficient private sector involvement so as to guarantee new coal technology so we in the Midwest can be confident that coal can be burned cleanly and safely, or whether you feel there is a paucity of these technologies and no need for a Federal commitment at this point.

As was alluded to by the previous questioner, the dollars you are commiting to this effort continue to slink year after year.

Secretary HODEL. In the budget of $138 million, which is well below the $311 million appropriated by the Congress in the 1983 appropriation continuing resolution, we have an increase, as you know, of about 27 percent over what we had proposed last year.

Again, I don't want to make too big a deal out of that, but I think it is important. In the reduction, there are a number of programs which are concluded that have been successfully completed, such as the Solvent Pilot Plant, the H-Plant, the Wilsonville Unit, and the like. There are a number of things phased out. So, in evaluating how the $138 million compares to the $311 million, I think we need to look at that.

We absolutely share your recommendation that coal is a major resource for this country, not only domestically, but for export. And the long-term prospects in that area are good as well.

As you know, the administration has some initiatives with regard to port development which I believe will be constructive, because the people who visit me from foreign countries are concerned about just how serious we are about being able to deliver coal.

In another part of our budget, we also have funding for the acid rain evaluation. It seems to me this is an area where this Department must have a major activity, because, if we look on coal as a major potential resource, we need to be trying to find answers to the problems that are being raised in that area.

The overall administration effort in that regard is increasing. It is a multiagency effort. I have asked our Assistant Secretary for Fossil Energy to take an increasing profile and lead with regard to the role that coal plays vis-a-vis acid rain and see to it that we are not losing out on the need for that technology.

Mr. DURBIN. That is all I have, Mr. Chairman. I would like to follow up with some written questions.

Thank you very much, Mr. Secretary.

The CHAIRMAN. Thank you, Mr. Durbin.

Mr. Gregg?

Mr. GREGG. Thank you, Mr. Chairman.

Mr. Secretary, I appreciate your being here today. Certainly the tenor of your remarks is refreshing and appropriate. However, I would just reinforce what many of the other people said, which is that the dollar figures seem to raise significant issues, especially in the area of conservation and solar.

In fact, specifically on the solar area, in zeroing out the categories which you have in the solar, haven't you basically eliminated the advanced component and material function of the solar research?

Secretary HODEL. I don't know. I am sorry, I don't know whether we have or not.

Mr. GREGG. I think you have. You also seem to have eliminated any ability to follow up on our monitoring capability for those solar projects which we spent a great deal of money on. Granted, maybe the money was inappropriately spent, to go into demonstration projects. But they are created and functioning and we do have monitoring capability. We have the front-end costs already taken care of. We are going to lose basically that cost. We seem to be wasting money basically that has already been spent.

Secretary HODEL. I would have to inquire about that in order to be able to respond adequately.

[The material follows:]

I believe the question refers to the elimination of the active and passive solar heating and cooling activities as separate line items in the fiscal year 1984 budget request. For budget purposes, the materials and components functions in these two former program areas have been combined with similar and related materials and components research in solar thermal, now all under the solar heat line item in the budget. It is my understanding that the fiscal year 1984 funding will support research and development across the three technologies involved and that several areas of more advanced and basic R&D will receive increased emphasis as compared to prior years. For example, the fiscal year 1984 budget proposes $11.75 million for materials work on solar heat technologies, an increase of $0.6 million from the fiscal year 1983 level. Efforts will be made to develop extremely advanced controllable glazing materials (passive), low-cost, high-performance polymer collectors (active) and heliostats (thermal).

All solar projects funded by the Department are monitored to completion. The fiscal year 1984 request includes $1.4 million to continue instrumented monitoring of a reasonable number of state-of-the-art solar heat systems and another $4 million to operate the Barstow solar thermal pilot plant. Instrumentation of the many now-antiquated systems funded in the early days of the program is not necessary and has not been proposed. The Department is sensitive to the need not to lose the benefits of previous Federal investments, and plans to ensure that results of our research efforts are packaged and disseminated to interested parties in the private sector. For instance, we plan to issue in the near future a comprehensive set of publications summarizing the technical results of the DOE solar building program.

Mr. GREGG. They are not big items. I wish you would take a look at them. I happen to agree with the Department's position that solar can compete in the marketplace. But I also feel we have spent a great deal of money on research in solar, and in these demonstration projects, and it would be really a waste for us not to take advantage of the information which is still being evolved out of those projects.

I also think it is important we consider the advanced component and material development in solar, because solar, unlike many other energy areas, does not have a unified approach within the marketplace. It is a disseminated approach. Small businessmen here and there starting up little companies in solar. They don't have the capacity to do that sort of research.

Now, I was wondering—I think there has been a report—where do we stand with the $100 million or so that was developed from the violation of the crude oil pricings regulations in the Emergency Petroleum Act, that is going to be directed back.

Secretary HODEL. It was $200 million. It was disbursed on February 4 to the States in accordance with the formula.

Mr. GREGG. OK. And how did the States manage that money?

Secretary HODEL. The States were requested and did advise us as to their willingness to expend the money in accordance with the five guidelines that were promulgated by the Congress. We will follow up subsequently to see that they have, in fact, expended the money in one of those five categories. They were required to make it additive to the program they had in place. They could not use it for administration.

Mr. GREGG. Is it up to the Governor's Office?

Secretary HODEL. Yes, within the five categories.

Mr. GREGG. Just to raise another issue, I realize FERC is an independent agency basically within your Department, but for those of us in the Northeast, we have had tremendous problems with FERC in the area of approval of low head hydro projects, I guess primarily because they are just so understaffed. But we have innumerable hydro projects in the private sector which are ready to go forward, but have been sitting 2, 3, 5 years. I was wondering if your Department intended to addresss that issue?

Secretary HODEL. I had no plans to address that separately. I was familiar with that while I served in the Department of the Interior, where our concern was from the standpoint of the Fish and Wildlife Service. The Federal Energy Regulatory Commission, in an attempt to deal with the problem you have identified, was proposing a major exemption approach. We took the position that the Fish and Wildlife Service, under the statutes creating it and empowering it to act, simply could not be cut out of the information loop and had to have at least a brief time to comment. These were on numerous small hydro projects, which FERC was proposing should be given an exemption. I have not followed that since I have been at the Department of Energy. But my understanding was although there were numerous applications—800 was the figure used with me—for just the small projects which would presumably be available for exemption, that as the exemption process was made known, not very many of those have ripened. That may very well have to do with financing problems or the operation of PURPA or the anticipated long-term price at which the power could be sold.

But the economics of low-head hydro and small hydro have not been improved in the last few years.

Mr. GREGG. We do have innumerable States, at least in my State, which are ready to go forward. At least we have private venture capital ready to take a chance on them, that is being tied up basically by regulatory timeframes.

Secretary HODEL. Perhaps those people should be encouraged to resubmit or retrigger. My understanding is there has not been a lot of activity, although FERC has tried to come forward with a workable exemption process. The larger projects are guided by a statute which is fairly demanding.

Mr. GREGG. These are all small projects.

Secretary HODEL. They should have available to them an exemption process which should be quite expeditious if there are no fish and wildlife problems.

Mr. GREGG. Can I send a list of the projects to your office for review?

Secretary HODEL. I would be happy to forward them to the Chairman of the Federal Energy Regulatory Commission where they do make recommendations.

Mr. GREGG. Great. I would appreciate that.

Now, you talked with Representative Schneider about the conservation budget. Basically, you have taken $130 million out of it, which was going to be used for weatherization, is that correct?

Secretary HODEL. Yes; $230 million is the grant portion.

Mr. GREGG. Which would all have been weatherization money?

Secretary HODEL. Yes.

Mr. GREGG. And it is your position you are going to continue—that is an inflexible position within the Department?

Secretary HODEL. That is a position which we think is appropriate. We will attempt to support it as effectively as we can. I seldom put myself in the position of saying something is an inflexible position, because in this world we flex. But my basic view is that it would be desirable, and I am well aware of differences of opinion on this with organizations concerned about the matters. We have discussed them at length. The weatherization program, I think, is appropriate to the Department of Health and Human Services. They now receive low-income assistance funding, and up to 15 percent of that, at the State's election, can be expended for weatherization programs.

It seems to me that one Department doing that is enough. One auditor going out and checking it is enough, one inspector general is enough.

The weakness of my position is that, in taking the $255 million out of the Department of Energy budget, I cannot trace it flowing over to the Department of Health and Human Services.

Mr. GREGG. They have cut their budget dramatically in this area.

Secretary HODEL. Their recommendation is below this year's appropriation.

Mr. GREGG. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Mr. Ottinger?

Mr. OTTINGER. Thank you, Mr. Chairman. I join in welcoming you to the committee for your first hearing.

I am concerned in the makeup of the energy budget in two respects. One, its matchup with the needs of the country. And second, what appears to be a continued flouting of congressional will. Congress has expressed it time and again in its budgets and its appropriations as desiring a balanced energy program. And the steady margin in this administration has been toward increasing imbalances.

The budget, as presently proposed to us, consists of 84 percent in the nuclear area, a lot of that in the breeder—60 percent in fission, 24 percent in fusion. The conservation budget has been cut by three quarters, from 15 percent to 4 percent. Fossil energy offers one of the great promises for the country in meeting its energy needs, from 13 percent to 7 percent, more than half. Solar and renewables in half, from 10 percent to 5 percent over last year's appropriation.

Considering that our national problem is primiarly with our dependence and the dependence of our allies on imported oil, how on earth can you justify in terms of needs or in complying with congressional expections a budget which is 84 percent in nuclear, and make the cuts indicated in conservation, renewables, and fossil, which certainly present a very important avenue to relieving our dependence on imported oil?

Secretary Hodel. We believe that the funding levels that you identified clearly indicate that continuing discussion and debate will have to be held over priorities. But, also, as I have said many times today, we at least have turned the trend of our requests. The percentage for the conservation, renewables, fossil areas, as compared to nuclear, is moving in the right direction, although it clearly has not reached the level that the Congress has appropriated.

I am well aware of that.

I also believe it is important in making those kinds of comparisons——

Mr. Ottinger. How do you justify it in terms of national needs? What is there that indicates we are going to need this kind of nuclear investment in our future? What is it that indicates that electricity is going to play that kind of a role in the Nation that would justify our spending 84 percent of our national energy budget on nuclear technologies?

Secretary Hodel. A part of that nuclear budget, as you are well aware, is the carry-forward of commitments made previously; and it is a continuation of funding levels, particularly the breeder portion of that, which is a significant chunk of the fission budget——

Mr. Ottinger. But we are awash in uranium. We are being asked to restrict our imports of uranium. There are technologies available which unfortunately the administration has channeled, for extended burn-up in existing fission reactors that would permit quantum leaps in our ability to utilize our existing uranium resources better.

What is the need for the breeder, the program of the size we have, in the current environment?

Secretary Hodel. The overall view of the energy future of this country is one on which we do not have a consensus. Before we can do it effectively, we really need to have an understanding on what the national industrial policy will be, what our lifestyle plans will be, as we look into the future. Depending on what that is, it is easy to identify scenarios which conclude we need no new electric generation on the one hand, to substantial reestablishment of the old growth rates.

You have in the Department of Energy, at this point, projects which have been essentially carried forward from prior commitments. As we look at a constrained Federal budget, the shorter term technologies, the more market amenable technologies, have tended to be cut more quickly. That would be my assessment as I look at what happened. I came in November, looked at the budget; and what has happened is that, in an effort to find ways to cut the budget, shorter term programs have been cut.

Mr. Ottinger. Let me just say that I would hope that as you get control over this situation, that there would be some matching, a study examination of what our national needs are likely to be, and what we are doing in the energy field, because I don't think that the committee or the Congress feels that this reflects what our real national needs are.

The other thing—I understand my time has expired—is my concern that with the vast cuts made in solar, conservation and fossil, knowing that Congress is going to restore a substantial amount of those monies, that those parts of your Department that handle those not be designated as they have in the past on the assumption there is nothing else there for the administration to work on, when you know full well the Congress will restore the funds. When we do restore the funds, I suspect there will be people there who will carry out those programs.

Secretary **HODEL**. If I may respond to that, I believe I commented on this before you were present. But I have asked that our Assistant Secretary for Conservation and Renewable Energy identify for me activities which we can undertake to help promote the continuation of the momentum in conservation and renewables at a time when again looking today at the oil picture, there will be people who say, who needs conservation, who needs renewables.

I am concerned that we not lose that momentum. I think we can take the lead and be very constructive utilizing the people you are talking about.

Mr. **OTTINGER**. I understand substantial numbers of the solar and conservation people have been transferred out now to work on the nuclear waste program.

Secretary **HODEL**. I do not believe that is accurate.

Mr. **OTTINGER**. Let me know.

Secretary **HODEL**. We did detail from our policy staff, which is in the Secretary's office, a number of people who are analysts, and clerical as well, to the nuclear waste effort, because of the very tight time schedules. But that is a detail not to exceed 6 months in order to meet the deadlines which we were provided by Congress.

Mr. **OTTINGER**. Thank you.

The **CHAIRMAN**. Thank you.

Mr. Walker?

Mr. **WALKER**. Thank you.

Could you tell me what kind of commitment is in the budget for doing something about the clean up at Three Mile Island during fiscal year 1984, Mr. Secretary?

Secretary **HODEL**. $37 million.

Mr. **WALKER**. That figure is approximately equal to the money that is in the budget in fiscal year 1983, is that correct?

Secretary **HODEL**. It compares to the $29 million in the 1983 budget, and is part of an overall commitment, I believe, not to exceed $143 million, which the Federal Government has with regard to that project.

Mr. **WALKER**. I want to thank you for continuing that commitment. It is the one major commitment that we have toward that clean up process that has come from this administration, of your Department. I want to thank you for pushing forward with that commitment, for that clean up.

Have you been pushing the industry to move toward making its financial commitment in the areas of Three Mile Island clean up?

Secretary **HODEL**. I have not personally, because I have had no occasion to do so. I have not had meetings with industry relating to Three Mile Island. I would be surprised to find that that has not taken place from the Department. I am confident my former deputy, Ken Davis, would have done that, and I am confident also Assistant Secretary Shelby Brewer will be doing that, because it is an important matter.

I said $143 million was our commitment. $123 million was our overall commitment previously.

Mr. Walker. Well, let me urge you to please do what can be done at the departmental level to encourage business to get involved in the Three Mile Island issue as well as the Clinch River issue, because one of our great problems is that the industry keeps talking about their sense of commitment, but we don't see any bucks coming forward, and as a result we see time schedules being stretched out in terms of addressing some of the vital needs in that area.

I would like to urge the Department to move forward in that area.

Have you been involved in trying to arrange any kind of international agreements towards getting some foreign money in for funding for Three Mile Island?

Secretary Hodel. I have not. I would have to inquire as to what has been done in the Department.

[The material follows:]

The Department is actively seeking to obtain agreements with several foreign governments or industrial organizations including Japan, Germany, and France to obtain their participation in the TMI program. This participation could be in the form of funding, equipment, or manpower, or a combination of these. In return, the foreign participants would be fully integrated into the program and would obtain detailed technical information on a timely basis, as well as samples of material and equipment.

I am informed that correspondence has been exchanged, agreements have been drafted, and visits have taken place. We are optimistic that we will be able to obtain mutually satisfactory agreements for foreign participation in the TMI program.

Mr. Walker. I would appreciate it if you could inform the committee and inform me what has gone on in that arena as well.

When we were in Japan recently with the chairman, the Japanese utility industry did indicate they were willing, at least in principle, to begin putting some money into that, and I think that the Department could find that that kind of commitment would certainly help with some of the financial arrangements necessary for getting that matter behind us.

Secretary Hodel. Excellent.

Mr. Walker. Let me ask in one other area. How much impact would there be on your ability to operate if Congress were to decide to freeze the entire budget at fiscal year 1983 outlay levels or authority levels. I would be glad to have you comment on either one.

Secretary Hodel. It would eliminate substantially all flexibility. It would presumably prevent the new initiatives that are proposed. It would prevent us from increasing the Three Mile Island commitment that we have—I am just trying to react to the question.

Mr. Walker. You don't think you could prioritize even within a budget figure? I see we are talking about a $10-billion budget figure. I am talking about aggregate totals.

Secretary Hodel. I thought you were saying freezing line items.

Mr. **Walker**. No; freezing the aggregate total here of your particular Department—with proper prioritization within that figure, what I am asking is, however we could—would we really go toward hindering your ability to operate?

Secretary **Hodel**. I am fond of saying that you don't find out how good a manager you are until you have limited resources. Basically, what you would be saying is, "Here it is; you come back and tell us how you are going to live with it." That is not unlike the budget process we live with now. In fact, you work toward a budget target and then you argue at the margins and you win some and lose some. So, I would say it would be an unusual approach. But it is really not unfamiliar to the budget processes.

I would say that the total departmental figure prior to adjustments for some budget and carryover amounts is $11 billion.

I am already negotiating at the margin.

Mr. **Walker**. OK. I am looking at the fiscal year 1984 budget figure. I am using the actual appropriations to your Department in 1983 and asking if you had to live within that same appropriated amount for 1984, whether or not that would cause real dislocations and really my followup question on that is, if Congress were to decide to do that early enough, isn't it a fact you could make some adjustments in what you were doing in 1983, planning toward 1984, to mitigate much of what would be a problem in trying to live within a frozen aggregate budget?

Secretary **Hodel**. Yes; that would be true. It would be responsive to one of the questions I had. The earlier we knew what our budget level in 1984 was, the easier it would be to adjust the 1983 activities to be sensible, rational in terms of that level, lower or higher.

Mr. **Walker**. If we talk about freezing aggregate totals of 1983, we are not talking about something which is wholly incapable of being done, is that correct?

Secretary **Hodel**. That is correct. It would represent a 5 percent reduction below the level we have recommended, but it would not be an impossible situation.

Mr. **Walker**. Thank you, Mr. Chairman.

The **Chairman**. Thank you, Mr. Walker.

Mr. Mineta?

Mr. **Mineta**. Thank you very much, Mr. Chairman.

Mr. Secretary, welcome to the committee. I would just like to ask about your views on the materials research aspect of the budget and the Department of Energy interest in advanced materials research as well as the Department's commitment.

A lot of the discussion here has really related to commitment in the sense of financial resources. I believe that is how probable commitment is measured. So, I would like to ask about your general views, interest, and commitment to advanced materials research.

Secretary **Hodel**. As you know, in this budget we have dollars——

Mr. **Mineta**. Putting your money where your mouth is——

Secretary **Hodel**. That is correct for a number of things relating to materials research. I think the significance of materials research is that, as we do basic research in high energy physics, as well as in other energy areas, one of the constraining factors tends to be the material with which we work. The opportunity to find out how materials work in particular environments is important to us, and we look at the fusion program or breeder program or high energy physics.

We look inside those materials, as I understand it—some of these facilities will be able to look inside the molecular structure of materials—to help figure out better ways to do things. I think that it is similar to our commitment to the basic research, the high energy physics research.

You can ask the question why, does a nation spend money on high energy physics research, what is the direct payoff? You cannot identify a future direct payoff. We can look back and say, look at the great benefits we have had. I think this falls into somewhat the same category.

I would say we are committed to that, and we think that is an appropriate role for the Federal Government to play. That is why we have increased funding for these activities at the very time when we have a severely constrained budget.

Mr. MINETA. I want to congratulate you on the inclusion—what you have done here in this area. I, frankly, look forward to working with you in this area.

I would like to also turn to the area of solar and conservation. It is my understanding that last June there was a hearing held on U.S. conservation and solar technologies in international markets. And we learned that the Europeans and the Japanese are increasing their near-term technology development efforts in areas like photovoltaics and industrial energy conservation, at a time when we are cutting our near-term work to zero. And several witnesses expressed their concern that we could lose out in international and even domestic markets as a result.

Now, given the administration's position of supporting high technology products in international markets, why does DOE continue to cut funding for developing the most promising of these projects?

Secretary HODEL. That comes down, ultimately, to one of those tough budget decisions. It is not to say those are not good or desirable programs; but in making those budget judgments that are needed when you have a constrained budget, you must make your priority judgments. We have opted as an administration in these circumstances to support strongly the basic research, the general science activity, and not be able then to identify the funds for the current short-term work which hopefully can be partially picked up, or fully picked up in some cases, by the private sector.

Mr. MINETA. Yet, given some of the other comments made here about other areas—Mr. Ottinger specifically referred to the 84-percent figure, Mrs. Schneider, and some of the other comments made here—it seems to me there is a sense of imbalance about where those priorities are, given the limited financial resources at hand.

Secretary HODEL. I understand the concern about a sense of imbalance, and have tried to take a partial step in trying to alleviate that.

I hope, ultimately that the Department and the Congress will be able to achieve a consensus on a balanced approach. I suspect that that will also be a matter of some dispute. As I am sure you can appreciate, there are certain sectors of the energy industry which think it is just about right. But I think, and I think the budget level requests indicate that obviously, also that we have manifested an imbalance. I am trying to rectify that. Obviously, I cannot do it as rapidly as some members of the committee or the Congress would prefer, and I don't know how much I can do. But I am trying to do that.

Mr. MINETA. Last year a large number of witnesses testified that if the current solar business tax credits are allowed to expire in 1985, several promising solar technologies that were developed by the Department of Energy such as photovoltaics, large wind systems, and solar thermal central receivers would not make it to commercialization. Have you done any studies on the effect of those tax credits on the market penetration of solar technologies, and if not, would you consider doing such a study?

Secretary HODEL. I understand that studies exist. I have talked to the sponsors of such studies. The advice I get is that, without such tax credits, which I find completely believable, the industry acceptance of some of these technologies would be sharply reduced. I indicated earlier today that my understanding is that the administration does not have a position at the present time on the extension of those tax credits. Therefore, my personal position is that I would recommend we continue them.

Mr. MINETA. Again, Mr. Secretary, I just want to thank you for your appearance before the committee. As you are probably well aware, I am brand new on this committee. I just want to congratulate you on your grasp of the issues of the Department since you are relatively new there as well.

Secretary HODEL. Thank you. I appreciate those remarks.

The CHAIRMAN. Thank you.

Mr. Young.

Mr. YOUNG. Mr. Chairman, I realize the lateness of the hour.

Mr. Secretary, Mr. Volkmer had started on the Elmo-Bumpy-Torus.

I would like to submit to you some further questions on the magnetic fusion program, and would like to make your answers a part of the record. I would appreciate it if you would give us a quick response to those questions.

I yield back the balance of my time, Mr. Chairman.

The CHAIRMAN. Mr. Secretary, we thank you very much. I know you have another meeting shortly. I just have one question and it relates to the high energy physics as contained in the continuing resolution.

How soon do you hope to have action completed on that, your implemental plans for that continuing resolution?

Secretary HODEL. I am advised that we have forwarded a proposal to the committee dated January 27, 1983, and we expect to hear back shortly on that proposal.

The CHAIRMAN. So we do have some time critical decisions to make on that affecting some of the labs and their ability to function. I am sure you are aware of all that. We do need to resolve it. I know it is not all your fault, either. I am not even implying it is your fault. But I hope we could have a resolution of it very shortly.

Secretary HODEL. My understanding is that we share that concern. As I say, we understand that we will be hearing back shortly, so we can move forward with the effort.

The CHAIRMAN. Thank you, sir.

We thank you very much for being here today.

Secretary HODEL. Mr. Chairman, I thank you for the opportunity to be here.

The CHAIRMAN. Thank you.

The meeting will stand adjourned.

[Whereupon, at 12:40 p.m., the committee was adjourned.]

[Questions and answers submitted for the record follow:]

POST-HEARING QUESTIONS AND ANSWERS

relating to the

FEBRUARY 8, 1983, HEARING

before the

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

WITNESS: SECRETARY HODEL

COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

March 1, 1983

Hon. Donald Paul Hodel
Secretary
Department of Energy
Washington, D. C. 20585

Dear Mr. Secretary:

Thank you for your testimony on the FY 1984 Department of Energy budget proposal before the Committee on February 8. The hearing provided our Committee Members an excellent opportunity to explore important issues with you. Our Subcommittees are now examining the various DOE programs in detail.

During the hearing you indicated that you would be willing to provide additional information in response to any written questions that we might have. Our supplementary questions are attached.

We would appreciate receiving your responses as soon as possible.

Sincerely,

Don Fuqua

DON FUQUA
Chairman

DF:Hcw
attachments

Department of Energy
Washington, D.C. 20585

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March 21, 1983

Honorable Don Fuqua
Chairman, Committee on Science
and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed are the responses to supplementary questions you submitted to Secretary Donald Paul Hodel following the February 8, 1983, hearing before the House Committee on Science and Technology, concerning the Fiscal Year 1984 Department of Energy budget proposal.

If you have any questions, please call Cathy Carey or Tom Pretorius of my staff on 252-4277. They will be happy to assist you.

Sincerely,

Thomas H Pretorius
for Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosures

RECEIVED
MAR 2 - 1983
COMMITTEE ON SCIENCE
AND TECHNOLOGY

GENERAL QUESTIONS - DOE ORGANIZATION AND MANAGEMENT

1. In many of the energy programs, success of the technology requires a solution of systems design and development issues rather than a basic scientific understanding. Does the administration policy, and this budget, account for the system design and development technology issues and how does it accomplish this objective?

It is true that the successful introduction of new technologies into the commercial marketplace often depends upon the satisfactory solution of issues or problems somewhat removed from basic scientific understandings. The Department's current research and development program does not address all "system design and development technology issues." At the same time, a conscious effort is being made to identify possible problems even if solutions to all are not being uncovered in the Department's programs. In the health and environmental research program of the Department, for example, adverse environmental and human effects of energy technologies are being explored systematically.

While the Department's current focus is on the initial stages of technology development (i.e., long-term, high-risk rather than demonstration activity), we never have lost sight of the fact that in the end, the objective of our R&D effort is to enable the results to show up in the marketplace. The programs included in our budget reflect that orientation and objective.

The Department's budget reflects that, of a total of $5.1 billion requested for total research and development and for R&D facilities, $1 billion is for basic research and a total of almost $4 billion is for applied research and development. It cannot be said that we have an inordinate commitment solely on the side of "basic scientific understanding." There is, I believe, a proper balance.

GENERAL QUESTIONS - DOE ORGANIZATION AND MANAGEMENT

2. In the past years "technology transfer" has been treated much like the weather, everybody talks about it but nobody does anything about it. (One problem has been accessing a large quantity of diverse information of questionable quality and value.)

Taking into account the fundamental problems in this area, what actions are you prepared to take to make technology transfer truly effective?

We are taking actions to make technology transfer from our research and development laboratories more effective. We are implementing the letter and the spirit of the Stevenson-Wydler Technology Innovation Act of 1980 (Public Law 96-480). In response to our requirements, each laboratory has an Office of Research and Technology Applications (ORTA) or equivalent organization. One of the ORTA functions is to identify technology with potential commercial application. The ORTA's may draw upon the laboratory technical staff and personal interactions of the researchers themselves with potential public and private users of the technology are key to our approach. I am informed that some selected technology transfer accomplishments reported by the laboratories in FY 1982 are as follows:

- An ultrathinning technique developed by the Pacific Northwest Laboratory was transferred to the Medical College of Georgia for the study of dental porcelain and dental microanatomy to aid in examination of calcified tissues.
- Sandia National Laboratories designed an electronically controlled pump, derived from weapon technology, that has provided reliable insulin delivery when implanted in diabetic patients. Design and know-how is being transferred to medical equipment manufacturers.
- Idaho National Engineering Laboratory, consulting to State governments on radioactive waste disposal, has helped in the drafting of seven regional plans for establishing disposal sites.

- A Los Alamos National Laboratory developed explosive is being used by industry. Hercules, Inc., has obtained a license for geothermal simulation applications and has produced pilot plant quantities of the material for commercial use.

- A heat pump hot water heater, developed by Oak Ridge National Laboratory, has been licensed to four manufacturers, with more companies expected.

- Solar Energy Research Institute developed a solar cell fabrication technology which will be commercialized by Solavolt International. Solar cells have been produced in the 10-12 percent efficiency range.

- Computer controlled cable tensioning equipment developed by Lawrence Livermore National Laboratory as part of the underground testing program has been transferred to the Reliance Electric Corporation. The system now is being marketed for private sector applications, principally in the oil industry.

- The Ames Laboratory has developed metallurgical processes and fabrication techniques for the in situ production of $Cu\text{-}NB_3Sn$ superconducting wire which are more economical and efficient than the procedures previously used. The Airco Corporation has used the Ames Process in the production of limited quantities of superconducting wire for high strength magnets.

- A geothermal power plant simulation computer program "GEOTHM" has been developed by Lawrence Berkeley Laboratory. It includes models of the properties of geothermal and geopressured brines at high temperatures with the main focus on $NaCl$ and Na_2SO_4 solutions with water. Bechtel has used the program in designing two geothermal power plants, one of which is now under construction in the Imperial Valley of California.

- The Morgantown Energy Technology Center has facilitated the transfer of state of the art simulation technology for large coal conversion process plants to private industry by the completion and delivery of the Advanced System for Process Engineering (ASPEN) software package. Developed by MIT under contract to Morgantown, the package is available through the National Energy Software Center and from National Technical Information Service.

I strongly concur with the Committee's concerns about the need for technology transfer. We would be foolish not to engage in prudent efforts to disseminate the results of the Department's research and development activities so that the country at large can benefit from the millions of Federal dollars invested in these areas.

In a search for useful new relationships between our laboratories and industry, we are working with industry associations, e.g., those representing small business and the venture capital community. We also are investigating new ideas such as the establishment of institutional arrangements adjunct to the laboratories which could facilitate performance of technology transfer functions. The ongoing technical information program at Oak Ridge will continue to receive technology assessments and forward them to the National Technical Information Service. Patent issues also are being addressed, and recently a class waiver was implemented covering reimbursable work for others done at the laboratories.

GENERAL QUESTIONS - DOE ORGANIZATION AND MANAGEMENT

3. Mr. Fuqua. In reviewing the various technology programs which are operating within the Administration's guidelines for the past two years, there are striking similiarities in many of the activities. For example, almost all the programs in fossil, nuclear, renewables, conservation, basic research, etc., have activities in materials research. How can any reasonable management structure coordinate these activities and prevent redundance and waste of the taxpayer's money, when the activities are going on in diverse organizational elements in DOE?

Mr. Hodel. While it is true that many of the Department's technology development activities closely parallel one another, the key difference in activities such as materials research is that specific program requirements and objectives vary. The reason that so many different organizational elements sponsor materials research is that materials problems are critical limiting factors in every area of energy technology. Consequently, every technology program must carry on activities focused on the materials problems that are specific to that technology. To avoid overlap and duplication as well as to optimize technology exhange between programs, we have an Energy Materials Coordinating Committee that includes representatives of all the organizations that sponsor materials research. In January 1983, The Energy Research Advisory Board to the Department initiated a high-level independent review of materials research of DOE programs across the board, including how DOE activities relate to materials research activities in other Federal agencies and in private industry. One of the objectives of this task is to identify and recommend steps to coordinate further energy materials research.

On a governmentwide basis, there is a Committee on Materials under the Office of Science and Technology Policy which is active in coordinating materials research.

Mr. Fuqua. Do you have any plans to assess the overall DOE organization and operation to improve its effectiveness and what is your timetable?

Mr. Hodel. In view of the prior question, I assume you now are inquiring as to my views on organization of the various DOE programs pertaining to technology. In that regard, we believe we are achieving a high degree of oversight and coordination of program activities and have no plans to assess the overall DOE organization because of any current concerns over how these varied program objectives and activities are coordinated. We always welcome the suggestions of the Committee as to ways in which we possibly might reorganize segments of the Department to achieve greater effectiveness.

GENERAL QUESTIONS - DOE ORGANIZATION AND MANAGEMENT

4. Mr. Fuqua. The morale of personnel at DOE is at a low level. How can you expect to operate the Department with any efficiency or effectiveness under these conditions, and what plans do you and the Administration have for improving the situation, particularly in light of the Administration's planned freeze of civil service pay and benefits?

Mr. Hodel. Employees in the Department of Energy are impacted by government-wide pay and benefits decisions as well as the more specific issue of the conditions in the Department. I will speak to the latter issue first.

I am very much aware that major uncertainties can have an adverse impact on employee morale. I have attempted to alleviate much of the uncertainty that existed when I came to the Department and to foster a greater sense of stability. In particular, I have held meetings with employees at which I have pointed out that substantial reductions in employment are behind us and any future reductions will be achieved primarily through attrition. I have encouraged them to focus on the continuing nature of the vast majority of our remaining programs and our joint need to ensure effective management of those critical energy and defense-related programs. I think I have been fairly successful in this effort and that there has been an upturn in morale as this message has worked its way through the organization.

As for the effect of the Administration's proposal concerning pay and benefits, it will be increasingly important for us, as responsible managers, to portray our programs and activities in such a manner that good, seasoned employees will find them challenging and will want to remain associated with us.

GENERAL QUESTIONS - DOE ORGANIZATION AND MANAGEMENT

5. Mr. Fuqua. Although the Department's non-nuclear energy budget has decreased significantly, you are no longer responsible for managing large demonstration projects, but rather an increased number of small activities. How can you justify the drastic decrease in the Department's civil service personnel who are needed to manage all of these diverse activities?

Mr. Hodel. The staffing levels included in the President's fiscal year 1984 budget request are sufficient to administer the programs and activities assumed in the budget. You will note that the staffing in certain program areas is increasing while staffing in other program areas with decreased budgets is decreasing. Management and support services overall are decreasing. Some realignment of staffing resources and mix of skills will be required.

Operation of the Department with fewer federal employees is possible because of a reduction in certain program areas such as the regulatory and near-term development and technology, the scaling down of marginal programs, increased contractor support in non-federal functions, and reduced support requirements as program areas decrease. We will continue to monitor and assess staffing requirements versus programmatic workloads to assure the timely accomplishment of programs and to maximize the effective utilization of staffing.

GENERAL QUESTIONS - DOE ORGANIZATION AND MANAGEMENT

6. How is the Department implementing the Small Business Innovation Development Act of 1982?

The Department's Small Business Innovation Research (SBIR) program is now in full operation. The program management is placed in the Office of Energy Research. The first SBIR Program Solicitation was issued on December 17, 1982, with a due date of March 1, 1983. It invited proposals from small business in 25 technical topics, spanning a wide spectrum of energy-related research and development. The Department has received over 9,000 requests for a copy of the Solicitation, and over 1,600 SBIR proposals already have been submitted. It is expected that, following a thorough technical review, about 100 Phase I awards will be announced in June, at an appropriate funding level of $50,000 per award.

QUESTIONS SUBMITTED BY CONGRESSMAN ROBERT A. ROE

Formerly Utilized Sites Remedial Action Program

QUESTION:	Can you supply for the record a more specific breakdown for these programs, commonly known as FUSRAP?
ANSWER:	The work breakdown structure expenditures for FUSRAP in FY 1984 are:

Remedial action projects	$ 8.0 million
Disposal site projects	1.2
Technology and System Studies	0.3
General Project Support	2.2
Capital equipment	0.3
Total	$12.0

In FY 1984, the remedial action projects will include:

- Completion of the remedial action for the central ditch adjacent to the Niagara Falls Storage Site.
- Completion of design engineering and NEPA documentation at Linde Air Products in Tonawanda, NY; Dupont in Deepwater, NJ; and Middlesex Landfill and the Middlesex Sampling Plant in Middlesex, NJ.
- Evaluation and preparation of the necessary NEPA documents and engineering designs for the stabilization of the St. Louis Airport Site, MO, incorporating the materials removed from the adjacent drainage ditches and the Latty Avenue site at Hazelwood, MO.

The disposal site projects will include the completion of the preliminary engineering study and the draft environmental report for possible use of the Weldon Spring, MO, sites for FUSRAP wastes in Missouri. The technology and system studies will include the research study of potential ocean disposal of selected FUSRAP wastes.

QUESTION 2:	Are funds for FUSRAP requested every year or is that unnecessary due to some kind of budget flexibility?
ANSWER:	Funds are requested separately every year for FUSRAP.

QUESTION 3:	Can you please inform me what specific clean-ups these programs have done in the past? Where and at what cost?
ANSWER:	I am informed that sites where remedial actions have been performed and the accompanying cleanup costs are listed below.

Period	Site	Cost (Millions of dollars)
1979-1980	Jersey City, New Jersey; former Kellex property	$1.32
1981-1982	Middlesex, New Jersey; 32 properties in the vicinity of the Middlesex Sampling Plant	8.29
1981	Lewiston, New York; a property adjacent to the Niagara Falls Storage Site	0.069
1982	Los Alamos, New Mexico; property at Acid Pueblo Canyon	0.261
1982	Los Alamos, New Mexico; property at Bayo Canyon	0.173
1982	Berkeley, California; University of California; several rooms in Gilman Hall	0.068

QUESTION 4: I understand that the Department recently reorganized its efforts in this area. Can you briefly indicate the reasons for this reorganization and what effects it may have on the program?

ANSWER: The radiological survey and certification functions for the remedial action programs currently carried out by the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness (EP) are being transferred to the Division of Remedial Action Projects under the Assistant Secretary for Nuclear Energy (NE). The functions being transferred are related closely to other NE engineering and remedial action activities. The transfer is being made to improve efficiency and effectiveness of accomplishing the remedial action programs.

QUESTIONS FROM CONGRESSMAN YOUNG

1. What is the Department's policy toward industrial participation in advanced research programs and magnetic fusion energy in particular?

Some element of industrial participation is a factor in all DOE advanced research programs. However, the type and level vary depending on the nature of the program, and must be treated on a case by case basis. The appropriate level of industrial participation in the fusion program has been the subject of much discussion. I think it is helpful to note the view of a recently convened National Academy of Science/Natural Research Council study on fusion engineering needs. The Panel found that "the Magnetic Fusion program currently needs the strengthened technological base and enhanced attention to economic viability that industry can provide."

Approximately 30 percent of the total magnetic fusion energy budget is provided directly to industry. The balance of DOE's fusion funds is provided to national laboratories, colleges and universities, other federal agencies, etc. I believe that this 30 percent facilitates substantial industrial participation in this program. This participation would grow significantly in a reactor engineering program, but that is at least a decade away. We plan to maintain and improve industrial participation in the scientific and technological development phase of the program which we now are entering to prepare for the subsequent engineering development phase.

QUESTIONS FROM CONGRESSMAN YOUNG

2. Do you, Mr. Secretary, encourage cost participation by industry, i.e., contributing money to advanced research projects?

I certainly do, Mr. Young. However, I don't expect this to be a major factor in long range advanced research projects because of the long time prior to application. In the case of magnetic fusion, the National Research Panel recently noted, "Because profitmaking industry is not likely to invest substantial amounts of capital in fusion in the foreseeable future, this involvement will be largely through Government-funded contracts, whether for the provision of components, engineering and managerial services, or personnel."

In cases where industry does choose to contribute financially to these programs, there must be full appreciation of the risks due to changing technical priorities which are a necessary characteristic of advanced research programs.

QUESTIONS FROM CONGRESSMAN YOUNG

3. What is the reason the magnetic fusion energy project, known as Elmo Bumpy Torus Proof of Principle, has been zeroed in FY 1984?

The decision not to proceed with construction of this project is an example of the changing technical priorities to which I just referred. New scientific measurements cast considerable doubt on the technical basis of the project. In addition, advances in other lines of research over the five years since this project was first considered have lowered its priority in the overall fusion program.

QUESTION FROM CONGRESSMAN McGRATH

Q. In my District in Long Island, New York, we have a resource recovery plant located in the Town of Hempstead. In the past two years, I have been in contact with officials of both the EPA and the Department of Energy regarding this plant, which has been closed for some time due to labor difficulties and the fact that the plant, when operating, emits dioxin.

A. The Department is well aware of the controversy that resulted from the possible presence of dioxins in the Hempstead facility's boiler flue gas and bottom ash. However, the Department has had no direct involvement with the facility from a funding or any other standpoint.

Our involvement in this area is from a research standpoint. The Department is funding a small analytical and experimental research program on the generic issue of air emissions from resource recovery plants. This research is concerned in part with the possible formation of toxic substances during any municipal waste combustion process. The results of this research are not expected until fiscal 1984.

QUESTIONS FROM CONGRESSMAN BATEMAN

NUCLEAR PHYSICS

1. Is it DOE and Administration policy to maintain this country's leadership in nuclear Physics?

   If the answer is yes, will special emphasis be given to furthering scientific progress in the area of quantum chromodynamics?

Because basic nuclear research is a central element in America's long term investment in its technological future with nuclear processes, the Department plans a vigorous scientific effort in FY 1984. From the DOE Nuclear Physics program, we expect an ever deeper understanding of nuclei and their role in the physical universe, and we expect a national base of knowledge, techniques, instrumentation, and skilled manpower in critical technologies. We are striving to maintain America's leadership in nuclear physics.

How quarks affect the makeup of nuclei, to what extent quantum chromodynamics is really an exact theory of the strong nuclear force, and how quarks behave once they are imbedded in nuclei are all very important scientific questions for nuclear physicists. Because of their importance, I expect that nuclear physicists will assign a special emphasis to the area of quantum chromodynamics over the next several years.

QUESTIONS FROM CONGRESSMAN BATEMAN

NUCLEAR PHYSICS

2. Will DOE request funding in FY 1985 for a 4 GeV electron accelerator, as recommended by the Barnes Subcommittee of the Nuclear Science Advisory Committee?

In the near term, the highest priority for new facility construction in basic nuclear research is the establishment of a high energy, high duty factor electron accelerator capability. Such a facility is viewed by the scientific community and the Department as the next logical step for advancement of basic nuclear research in the United States.

A special panel of the DOE/NSF Nuclear Science Advisory Committee (NSAC) is now reviewing five proposals for construction of a high energy, high duty factor electron accelerator capability. These proposals involve significantly differing accelerator concepts and maximum energies varying from 0.75 GeV to 4 GeV. The NSAC panel is charged with examining each proposal as a possible component of the overall national program of basic nuclear research and recommending the facility or combination of facilities which will best meet the United States needs for basic nuclear research with electromagnetic probes.

The decisionmaking process is well advanced and is proceeding on a schedule compatible with the Department's FY 1985 budget schedule. The scientific opportunities are real. There is, thus, a genuine possibility that construction of an electron accelerator facility will be a strong contender for consideration as the FY 1985 budget is formulated.

QUESTIONS FROM CONGRESSMAN BATEMAN

NUCLEAR PHYSICS

3. If a 4 GeV CW electron accelerator is funded, do you believe that a proposal for a CW electron accelerator at an energy level lower than 4 GeV should be accepted and federally funded?

I am informed that if 4 GeV is selected as the appropriate energy for a high energy, high duty factor electron accelerator, it will be because of high priority assigned to work at energies near 4 GeV. Thus, we reasonably can expect that the 4 GeV accelerator will spend little of its time at energies below 1 to 2 GeV. Discussions within the scientific community lead us to believe that there is important research to be done at energies below 2 GeV. It is entirely possible that a convincing case can be made for a second, lower energy electron accelerator.

QUESTIONS FROM CONGRESSMAN BATEMAN

NUCLEAR PHYSICS

4. Dr. Keyworth, the President's Science Advisor, has stated Administration policy as upgrading university research facilities and improving the quality of science education. Do you regard construction and operation of a high energy electron accelerator by a consortium of several universities more consistent with announced Administration policy to enhance the research education missions of our universities, rather than operation of such a program by a single university or government laboratory?

The question as to whether a facility operated by a consortium of universities has a greater educational value than one operated by one university or a government laboratory is debatable. The Department has facilities that are operated in each of these three ways, and there is not a noticeable difference among them.

It should be kept in mind that the operation of the facility itself is of little educational value. In contrast, the research done at the facility is of critical educational importance. Most of the research on the Department's High Energy and Nuclear Physics facilities is done by universities, no matter where the facility is located, or who operates it.

FISCAL YEAR 1984 DEPARTMENT OF ENERGY AUTHORIZATION

MONDAY, MARCH 14, 1983

House of Representatives, Committee on Science and Technology, Subcommittee on Energy Development and Applications, and Subcommittee on Energy Research and Production,

Washington, D.C.

The subcommittees met, pursuant to call, at 2 p.m., in room 2318, Rayburn House Office Building, Hon. Marilyn Lloyd Bouquard (chairman of the Subcommittee on Energy Research and Production) presiding.

Mrs. Bouquard. The subcommittees will come to order.

Good afternoon, ladies and gentlemen. We are glad to have all of you with us, and especially our students who are here with us today.

I do have a unanimous consent request. Pursuant to House rules, television and other recordings of today's hearings will be permitted. Since there is no one else here, no objections are heard, and so ordered.

Today we will be receiving testimony from the Department of Energy on the fiscal year 1984 budget request for departmental administration and other management programs. These activities provide general management and support services to all elements of the DOE. We are very interested in examining and understanding the funding requests for these important activities.

Included in the areas we will be discussing today is the Office of Management and Administration, for which $116 million is requested for fiscal year 1984. The request is a decrease of $15 million from the fiscal year 1983 level, and we would like to understand what exactly are the ramifications of such a reduction—in terms of both manpower levels at DOE headquarters and the agency's ability to carry out the energy programs as mandated by Congress.

I understand that this request is based to a large extent on the administration's continued interest in merging the DOE with the Department of Commerce, yet, we have not seen legislation to accomplish this merger. So my concern is, what will happen to the DOE's ability to manage their programs in fiscal year 1984 if such a merger does not take place?

The Operations Offices are also slated in the request to receive a $15.6 million cut and a personnel reduction of 289 full-time equivalents. We would like to determine the basis for these reductions in light of the very important job these offices have to do in coordinating the contractors' work, including the work performed by the national laboratories.

We are also concerned about a large reduction in the intergovernmental affairs area where the legislative liaison people have done such a splendid job under a heavy workload. Finally, given the great uncertainties in national energy direction, I wonder if it is appropriate to drastically cut funding for Policy, Planning, and Analysis.

Other management programs we will be reviewing include in-house energy management activities and technical information services, a function with which I have considerable familiarity from Oak Ridge.

We are pleased to have with us today, Martha O. Hesse, the Assistant Secretary for Management and Administration. This is Ms. Hesse's first appearance before our subcommittees since she was appointed by the President last November. We welcome you here today.

Accompanying Ms. Hesse is Hunter Chiles, who is Director of the Office of Policy, Planning, and Analysis. We extend our welcome to you, too.

[The opening statements of Mr. Sensenbrenner follows:]

OPENING STATEMENT OF THE
HON. F. JAMES SENSENBRENNER, JR. (R-WIS.)

EDA/ERP JOINT SUBCOMMITTEE HEARING ON
DOE BUDGET REQUEST FOR DEPARTMENTAL ADMINISTRATION
FOR FISCAL YEAR 1984

MARCH 14, 1983

THANK YOU, MADAM CHAIRMAN, FOR THIS OPPORTUNITY TO EXTEND A WELCOME TO MARTHA HESSE, ASSISTANT SECRETARY FOR MANAGEMENT AND ADMINISTRATION OF THE DEPARTMENT OF ENERGY.

WE LOOK FORWARD TO HER TESTIMONY TODAY ON THE FY 1984 BUDGET REQUEST FOR THE DEPARTMENT OF ENERGY'S DEPARTMENTAL ADMINISTRATION PROGRAM. THE DEPARTMENTAL ADMINISTRATION PROGRAM PROVIDES GENERAL MANAGEMENT AND SUPPORT ACTIVITIES TO ALL OF THE DEPARTMENT. IT IS A VITAL COMPONENT OF THE DEPARTMENT'S ENERGY POLICY.

THE ADMINISTRATION HAS PROPOSED SIGNIFICANT REDUCTIONS IN THE BUDGET AND THE NUMBER OF PERSONNEL ASSIGNED TO THIS PROGRAM. THESE REDUCTIONS ARE PREMISED ON SAVINGS ATTRIBUTABLE TO CONSOLIDATIONS AND REDUCTIONS IN ENERGY PROGRAMS. WHILE I AM SUPPORTIVE OF COST-EFFECTIVE MANAGEMENT EFFORTS, THESE EFFORTS MUST NOT HINDER OUR ENERGY POLICY.

I LOOK FORWARD TO YOUR TESTIMONY CONCERNING THE FY 1984 BUDGET REQUEST AND ITS EFFECT UPON OUR ENERGY PROGRAMS.

Mrs. **Bouquard**. You may proceed with your testimony as you wish. Welcome to our subcommittee.

[The biographical sketches of Ms. Hesse, Mr. Chiles, and Mr. Johnson follow:]

U.S. Department of Energy
Assistant Secretary for
Congressional, Intergovernmental
and Public Affairs
Office of Public Affairs
Washington, D.C. 20585
202/252-5644

BIOGRAPHY

MARTHA O. HESSE

Martha O. Hesse was named Assistant Secretary for Management and Administration, U.S. Department of Energy (DOE) on November 10, 1982, pursuant to a recess appointment granted by President Reagan. She was confirmed for the position by the Senate on December 8, 1982.

In this position, Ms. Hesse serves as the Department's chief administrative officer, reporting directly to Secretary of Energy Donald Paul Hodel. Her duties, in addition to administrative and personnel management, include responsibility for contracting and procurement, and the financial and accounting activities of the Department.

Before joining DOE, Ms. Hesse was Executive Director of the President's Task Force on Management Reform, located in the Office of Management and Budget.

From February 1981 until her White House assignment, Ms. Hesse was Associate Deputy Secretary of Commerce, where she provided direct support to the Deputy Secretary in administering the overall operations of the Department and resolved major policy and program operation issues that arose between the bureaus of the Department.

A prominent Chicago businesswoman, Ms. Hesse in 1969 became director and chief operating officer of SEI Information Technology in Chicago. As cofounder of this professional services company, she held key management positions and directed the company's business activities.

From 1966 to 1969, Ms. Hesse was Director of the Data Management Division, American Hospital Association. From 1964 to 1966, she was a research analyst with the Blue Shield Association.

Ms. Hesse, 40, attended the University of Iowa majoring in psychology, and received an MBA (The Executive Program) from the University of Chicago in 1979. She currently serves as Vice Chairman of the Dean's Fund at the University of Chicago's Graduate School of Business.

December 1982

U.S. Department of Energy
Assistant Secretary for
Congressional, Intergovernmental
and Public Affairs
Office of Public Affairs
Washington, D.C. 20585
202/252-5644

BIOGRAPHY

J. HUNTER CHILES, III

J. Hunter Chiles, III was appointed Director, Office of Policy, Planning and Analysis, U.S. Department of Energy (DOE), on June 1, 1981. In this position, Mr. Chiles is responsible for developing national energy policy, coordinating the analysis and evaluation of policies and programs, and conducting a continuing assessment of the Nation's energy situation. In addition to Mr. Chiles being Director, Office of Policy, Planning and Analysis, he was appointed Special Assistant to the Secretary, U.S. Department of Energy on June 1, 1982 and served concurrently in that position until November 5, 1982.

Prior to government service, Mr. Chiles was chief energy policy planner for Westinghouse Electric Corporation at corporate headquarters in Pittsburgh, Pennsylvania. Joining Westinghouse in 1960, he held engineering and management positions of increasing responsibility until his appointment as Director of Strategic Marketing Operations in 1980. As Director, he was responsible for long-range forecasting of energy supply and demand, domestic electricity requirements, and economic trends, as well as corporate support in long-term energy research and development and analytical predictions concerning the business environment and implications for products and services.

Mr. Chiles is a graduate of Virginia Polytechnic Institute with a Bachelor of Electrical Engineering degree. He received a master's degree in business administration from the University of Pittsburgh and his professional engineer's license in 1968. Mr. Chiles' military service was in the U.S. Army as a guided missile staff officer, supervising maintenance of the Army's missile systems.

He is a recognized authority on the subject of energy and is in demand as a speaker nationally and internationally. In addition, Mr. Chiles has testified on energy matters before many government organizations.

Born in Sharon, Pennsylvania, Mr. Chiles currently resides in Fairfax, Virginia. He is married and has two sons.

November 1982

U.S. Department of Energy
Speakers Bureau
Office of Public Affairs
Washington, D.C. 20585
202/252-5644

BIOGRAPHY

R. TENNEY JOHNSON

R. Tenney Johnson was confirmed General Counsel for the U.S. Department of Energy (DOE) on June 2, 1981. As DOE's General Counsel, Mr. Johnson is responsible for the Department's legal programs and policies with the exception of those related to the Federal Energy Regulatory Commission, which maintains a separate legal staff.

Prior to service with DOE, Mr. Johnson was a partner in the Washington, D.C. law firm of Sullivan & Beauregard. He joined that organization in 1978.

Before entering the private sector, Mr. Johnson had served with various Federal agencies and on special Government committees since 1959. His agency appointments included service as a Member of the Civil Aeronautics Board (CAB), 1976-77; General Counsel with the Energy Research and Development Administration (ERDA), 1975-76; General Counsel at the National Aeronautics and Space Administration, 1973-75; General Counsel for CAB, 1970-73; Deputy General Counsel for the Department of Transportation (DOT) 1967-70; Deputy General Counsel for the Department of the Army, 1963-67; and attorney in the Office of the General Counsel, Department of Defense, 1959-63.

Mr. Johnson was Chairman of the Organizational Integration Working Group, DOE Activation Task Force, from June until September 1977. During the period 1975-79, he served as U.S. Co-Chairman, U.S./U.S.S.R. Joint Working Group on Intellectual Property, U.S./U.S.S.R. Agreements for Cooperation. From 1970-72, he served as Consultant on Patent Policy and Indemnification against Unusually Hazardous Risks, Commission on Government Procurement.

He received an A.B. degree with High Honors from the University of Rochester in 1951 and an LL.B. degree from Harvard Law School in 1958. From 1954 to 1955, Mr. Johnson engaged in graduate study in English literature at Trinity College, Dublin (Ireland). The latter undertaking was on a Phi Beta Kappa Fellowship for Travel and Study in Europe. He served as a Lieutenant in the U.S. Navy from 1951 to 1954.

Mr. Johnson is an active member of the District of Columbia Bar, the American Bar Association, and the Federal Bar Association. His honors include the Distinguished Service Award, presented by ERDA in 1976; the Meritorious Achievement Award by DOT in 1968; and the Exceptional Civilian Service Decoration by the Department of the Army in 1967.

A native of Evanston, Illinois, but now a resident of Bethesda, Maryland, Mr. Johnson is married and has three children.

June 1981

STATEMENT OF MARTHA O. HESSE, ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION, DEPARTMENT OF ENERGY, ACCOMPANIED BY J. HUNTER CHILES III, DIRECTOR, OFFICE OF POLICY, PLANNING, AND ANALYSIS

Ms. **Hesse**. Thank you, Madam Chairman. I am pleased to be here today to talk to you about the 1984 budget request for departmental administration and also certain pieces of the energy supply research and development appropriation. The total 1984 request for those activities is slightly more than $171 million.

I have a long prepared statement, but at this time I would like to submit it for the record and briefly summarize some of the activities.

Mrs. **Bouquard**. We have your complete testimony. You may summarize and proceed as you wish. Your complete testimony will be made part of the record.

Ms. **Hesse**. The departmental administration request, including revenue offsets, amounts to about $142 million and funds the general management and support activities of the Department of Energy. There are 11 major programs within this appropriation and they are, briefly, the Office of the Secretary; the General Counsel; Inspector General; Congressional, Intergovernmental and Public Affairs; the Office of Minority Economic Impact; Policy, Planning and Analysis; International Affairs; Management and Administration—five multipurpose operations offices, cost of work for others, and miscellaneous revenues. These provide the services necessary to support the departmental program.

There are three additional programs for about $30 million funded within the energy supply R&D appropriation. They include in-house energy management, a program to improve the energy efficiency of DOE buildings and facilities and laboratories; the technical information services program at Oak Ridge, which you are familiar with, a centralized technical information service for the Department's managers and contractors; and plant engineering and design which funds advanced architect/engineering services for certain nondefense construction projects.

I would like to take a few minutes to talk about the way our 1984 request is structured and about the table, because I think it is slightly misleading. The pure numbers show about a 57-percent decrease from 1983 to 1984. But if you actually try and segregate apples with apples, and oranges with oranges, if you will, if you remove revenues and cost of work that is directly associated with the generation of those revenues, plus the $13 million deferral, you will find our request is down about $40 million, or 16 to 17 percent.

The number of full-time equivalents we are requesting is also down about 16 percent. I think that in addition to reorganization, which I am sure we will talk about in a few minutes, there are a number of other factors that are important in this reduction. The first is a lag factor. The number of people required for departmental administration is very sensitive to the specific programs populations. But when there are reductions in programs, there is a lag of at least 1 year before there would be corresponding reductions in departmental administration. It is now in this year, in 1984, that we will see some of these reductions take place in management and administration in particular.

There is another factor that I think is very important. That is efficiency. DOE has been in existence since 1977. This is about our sixth year. When you form a Cabinet department, a very complex Cabinet department from nine different agencies and various programs, it takes a long time for the management systems to settle in and settle down. I think that now that we are in our growth cycle or life cycle, we will be able to at this time effect some efficiencies. Another factor is OMB Circular A-76 requirements. We would presume that we would do a number of Circular A-76 studies in 1984 that would subsequently result in contracting out of services. But I want you to know that there will be adequate staff to efficiently and effectively support and manage the programs in DOE, but that the staffing will be streamlined and it will be much leaner than it is now.

That concludes my summary. Hunter Chiles, who is here with me, will be pleased to respond to any questions you might have.

[The prepared statement of Ms. Hesse follows:]

PREPARED STATEMENT OF MARTHA O. HESSE, ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION, DOE

Mr. Chairman, Madam Chairman, and Members of the Subcommittees, I am Martha O. Hesse, Assistant Secretary, Management and Administration of the Department of Energy. Accompanying me today is J. Hunter Chiles III, Director of Policy, Planning, and Analysis. We appreciate the opportunity to appear before you today in support of the fiscal year 1984 budget request for the Departmental Administration Appropriation, and Technical Information Services, In-House Energy Management, and non-defense Plant Engineering and Design requested in the Energy Supply Research and Development Appropriation. The total fiscal year 1984 request for these activities is $171.4 million.

Two appropriations fund these activities. The Departmental Administration appropriation request totalling $141.9 million includes General Management and Support Activities, and the Energy Supply Research and Development Appropriation totalling $29.5 million covers program costs for Technical Information Services, In-House Energy Management, and non-defense Plant Engineering and Design.

The $171.4 million request includes $124.8 million for salary and related expenses, $110.5 million for support services, $14.4 million for In-House Energy Management, $14.1 million for Technical Information Services and $1.0 million for Plant Engineering and Design. Also included is $116.2 million for Cost of Work for Others and $209.6 million in offsetting revenues.

I would like now to present a brief summary of each of the major activities in the two appropriations.

OFFICE OF THE SECRETARY

The request for Office of the Secretary includes $927,000 for salary, expenses, and travel costs of 20 FTE's to provide central direction and supervision of energy programs.

THE OFFICE OF GENERAL COUNSEL

The Office of General Counsel from the broadest perspective, supports, rather than runs, programs, with the exception that the General Counsel conducts the Department's patent and standards of conduct programs. General Counsel performs the traditional lawyer's functions for the Secretary and the Department, with the exception of the Federal Energy Regulatory Commission. These functions include legal counseling, legislative drafting, conducting rulemakings, providing legal advice to the negotiation of contracts, and conducting litigation. The request for this Office is $11.8 million and 226 FTE's.

INSPECTOR GENERAL

The Office of the Inspector General responsibilities are to detect and prevent fraud and abuse and to promote economy and efficiency in the programs and operations of DOE. These responsibilities relate to the work of over 17,000 people directly employed by the Department, to about 115,000 people working for DOE contractors at Government-owned, contractor-operated facilities, and to the activities of employees of many thousands of other contractors and grantees of the Department. The request for this Office is $14.7 million and 180 FTE's.

MANAGEMENT AND ADMINISTRATION

Management and Administration includes funding for personnel salaries and benefits for the Procurement and Assistance Management Directorate, the Office of the Controller, and the Office of Administration. The request also includes support service costs for all Headquarters personnel. Of the $116.2 million requested in fiscal year 1984, $36.5 million is for the salaries of a total of 950 full-time-equivalents and $1.9 million for related travel. The support services request of $77.8 million provides for Headquarters space rental, supplies, transportation, communications, printing and graphics, and purchase of capital equipment.

CONGRESSIONAL, INTERGOVERNMENTAL AND PUBLIC AFFAIRS

This Office has been responsible for developing, managing and ensuring coordination of relations with the Congress; news media; State, Territorial, tribal and local government officials; other Federal Agencies; consumer, business and citizen organizations; the general public; and for the promotion of competition in the energy industry. The request for this Office is $3.4 million and 50 FTE's.

OPERATIONS OFFICES

Five of the eight Operations Offices are multi-purpose in nature and are funded within Departmental Administration in the amount of $77.5 million. $55.5 million is for salaries and related expenses; $1.9 million is for travel; and $20.1 million covers space rental, supplies, transportation, communications, and related support services and capital equipment requriements. This estimate funds staffing of 1,457 full-time-equivalents.

These five multi-purpose Operations Offices perform a wide variety of program execution and project management functions throughout the country. The principal functions are technical direction or project management of nuclear research and development, energy research and development, and defense programs activities; contract administration and day-to-day management oversight of Government-Owned Contractor-Operated facilities; design, engineering and construction management; procurement; health, safety and environment oversight; property and real estate management; contractor industrial relations; Financial management; and management of related support services. The other three Operations offices primarily support Defense Activities are not funded by the Atomic Energy Defense Appropriations.

MINORITY ECONOMIC IMPACT

The responsibilities of the Office of Minority Economic Impact include advising the Secretary of Energy on the impact of National Energy policies, programs, and regulations on minorities; providing technical and management assistance to minority educational institutions and minority business enterprises to increase their participation in energy activities; and providing direct loans to minority business for the development of proposals or bids to the Department. The request for this Office is $1.7 million and 11 FTE's.

POLICY, PLANNING, AND ANALYSIS

The Office of Policy, Planning, and Analysis (PPA) servies as principal advisor to the Secretary of Energy for formulating and recommending national energy policy.

PPA develops, analyzes and recommends major energy policy initiatives and ensures the review and integration of policy proposals developed in the various program areas. The Office also concentrates upon emerging energy issues, forecasts of long-term energy supply and demand, strategic planning issues, analysis of potential policy options, and analytical efforts required for policy development. Other major PPA efforts on behalf of the Secretary include such cross-cutting issues as the Department's long-range strategic planning process. PPA also coordinates the Secretary's participation in the Cabinet Council process. Finally, PPA is responsible for advising the Secretary on the development and analysis of legislative proposals to support policy objectives, analyzing and evaluating DOE proposals to reduce and eliminate counter-productive regulations and in general, helping to assure that policies are formulated which promote economically efficient energy production and use. The request for this Office is $5.7 million and 35 FTE's.

INTERNATIONAL AFFAIRS

The Office of International Affairs supports various entities of the U.S. Government in international energy and nuclear nonproliferation programs. International Affairs does this by providing the necessary leadership in developing and carrying out international energy policy and programs throughout DOE; by tying together domestic and international energy policies and programs; by administering the Department's international nuclear program including U.S. policies on nuclear cooperation, non-proliferation and exports; by processing subsequent arrangements; and by developing, implementing and evaluating international cooperative research and development agreements. The request for this Office is $2.6 million and 35 FTE's.

COST OF WORK FOR OTHERS AND MISCELLANEOUS REVENUES

Cost of Work for Others covers expenses for materials and services to non-Federal organizations when such products or services are not readily available from the private sector. The fiscal year 1984 estiamte is $116.2 million. The Department will receive an estimated $135.2 million in Miscellaneous Revenues as reimbursements for this work. Revenue estimated at $74.4 million are also earned from the sale of by-products, such as reactor steam and special nuclear materials. Since these are by-products, there is no cost of work incurred.

IN-HOUSE ENERGY MANAGEMENT

The fiscal year 1984 request for In-House Energy Management is $14.4 million. The In-House Energy Management Program represents a continuing investment to improve the energy efficiency of DOE buildings, facilities and operations. This program continues the retrofits required under the National Energy Conservation Policy Act of 1978 and Executive Order 12003 of July 20, 1977. The program of energy saving retrofits proposed today has a payback period of 1.9 years with an annual energy saving to the Department of 315,000 barrels of oil equivalent. With this short payback period the program helps to reduce utility costs. Proposed funding also continues the program of conservation surveys to identify future retrofit projects, central plant studies to evaluate the economc feasibility of fuel conversions and cogeneration of electricity, and any other conservation methods that will reduce overall energy consumption with the Department. Because DOE is the Government's second largest user of energy, the potential for savings is substantial.

TECHNICAL INFORMATION

The Technical Information Services Program, managed by the Technical Information Center in Oak Ridge, Tennessee, is a centralized technical information service for the Department's program managers and contractors. The program supports the Department's energy research and development effort by collecting, managing, controlling and disseminating scientific, technical and engineering energy information. The fiscal year 1984 budget request for the Technical Information Services Program is $14.1 million, which includes $13.3 million for operating expenses and $0.8 million for purchase of capital equipment. This request will support 170 full-time equivalents.

PLANT ENGINEERING AND DESIGN

The Plant Engineering and Design request of $1.0 million covers funding of advanced Architect—Engineering services in support of proposed non-defense construction projects considered critical to the timely accomplishment of the Department's mission. The funding will allow selected projects to proceed directly from conceptual design into Preliminary and Definitive design and permit us to provide better cost and schedule estimates to Congress.

That concludes my summary of programs. I will now address the specific issues you had requested.

REORGANIZATION

The fiscal year 1984 Department of Energy Budget assumes that there will not be a Cabinet-level Department for energy activities. However, the Department has had considerable staffing reductions over the past few years consistent with reduced programs in certain areas, such as Regulatory and near-term development and technology, and scaling down of marginal programs. Commensurate reductions are now proposed for the Departmental Administration-funded areas, which include the Department management and support functions.

MANPOWER FUNDING

The funding levels for manpower in fiscal year 1984 are somewhat reduced with most of the reductions concentrated in the Departmental Administration account. The staffing in the Headquarters programmatic areas are consistent with the programmatic budgets and are adequate to administer the budgeted programs. The reductions in the Departmental Administration account reflect reduced management and support requirements in both Headquarters and field offices because of reduced programs. In specific areas, we may have to reevaluate our requirements depending upon the final action taken concerning the Departments' request in program areas which this account supports. The operations offices are scheduled for staffing decreases consistent with the decreases in non-defense related programs. The operations offices continually assess programmatic budget and workload levels and adjust staffing mixes based on current priorities and workloads. In fiscal year 1984, we do expect the operations office managers to make some organizational and management improvements which should also contribute to reduced staffing requirements.

OPERATIONS OFFICE FUNDING AND MANPOWER LEVELS

A table displaying the funding and manpower levels for each of the Operations Offices is provided herein.

STATUS OF POLICY, PLANNING, AND ANALYSIS

With respect to the Office of Policy, Planning, and Analysis, an independent policy office continues to report to the Secretary. Program organizations have assumed greater responsibility for policy analysis and policy studies related to their programs performed by the central policy staff will assure proper oversight and consistency throughout the Department.

This concludes my prepared statement. We will be happy to respond to any questions you may have.

OPERATIONS OFFICES—DEPARTMENTAL ADMINISTRATION

[Manpower by fiscal years]

Office	Full time equivalent—total		
	1982 actual	1983	1984
Chicago	402	395	288
Idaho	185	234	193
Oak Ridge	548	532	494
Richland	286	297	262
San Francisco	282	283	220
Total	1,703	1,746	1,457

FISCAL YEAR 1984 BUDGET

[Dollars in thousands by fiscal years]

Office	Budget authority 1982	1983	1984
Chicago	$20,152	$20,908	$15,916
Idaho	10,370	13,051	10,860
Oak Ridge	24,372	26,380	23,235
Richland	12,790	16,014	13,608
San Francisco	14,521	16,708	13,836
Total	82,205	93,061	77,455

Mrs. **Bouquard.** Thank you very much. I want to go back to the budget which is, from all indications, based on a planned merger of DOE and Commerce. When is the administration planning to submit such a proposal to the Congress?

Ms. **Hesse.** I recognize that in the President's request that went to the Hill, it did say the administration would be submitting legislation. I also know that we have not yet done that and there is clearly a gap. I cannot tell you when the administration intends to submit legislation to reorganize the Department of Energy.

Mrs. **Bouquard.** If there is no merger proposal sent to the Congress, what adjustments are you going to have to make in your budget? Will you ask for supplemental appropriations? What are the plans in this regard?

Ms. **Hesse.** If there is no reorganization or the reorganization is not fully effected, at that point we would go back and evaluate our programs and staffing needs, and then come back to you with a plan for increased levels.

Mrs. **Bouquard.** I want to applaud you on management and efficiency. I think those are always worthwhile goals. Let's talk about the Technical Information Center. I think you really have to visit the Center to see what a very unique and valuable service this is; it is where all of the information on our basic research is stored. It is truly a treasure house of all this information. Without storing this information, it cannot be properly disseminated or used. But it is really mind-boggling, the information that is available from this Center. It seems to me that this is such a critical activity, and that if you reduce the scope of it just a few dollars, it is not exactly wise.

I would appreciate it if you would look at it a little bit further. Tell me what you really intend to cut out or delay with this reduction. You, or Mr. Chiles, either, may respond.

Ms. **Hesse.** Thank you. I would be glad to address that. I was in Oak Ridge last week, or the week before. I did spend several hours at the Technical Information Center. I agree with you. I was very impressed with not only the quality of the work that they perform, but certainly the general environment. It is very interesting. The people are very enthusiastic.

Mrs. **Bouquard.** You really have to see it to appreciate what goes on there.

Ms. **Hesse.** You do, indeed. They have done a terrific job. The funding for the Center in 1984, we propose to reduce that about 7 percent. The employment levels would remain essentially the same. We will not change, there will be no influence or effect on the international program. The funding for that from 1983 to 1984 remains unchanged at $6 million. What we would be changing would be delaying some of the computer system upgrades, which amounts to maybe a half million dollars.

Also, to eliminate a portion of a central document registry program which has to do with the cataloging and dissemination of certain DOE publications as well as dissemination of secondary use public information kinds of brochures. We are not intending to cut the level of service at all. I think what we are trying to do is just impose the same fiscal constraints on the Technical Information Center that we feel all of the other areas should observe.

Mrs. **Bouquard**. You mean you are going to cut back on the brochures, publications that are published by the Center?

Ms. **Hesse**. Not with their main technical reports, but with, say, consumer-type brochures, secondary distribution of public use information. Not that data which goes to the contractors or the scientists or technicians, but a distribution function for a program that is the responsibility of congressional, intergovernmental, and public affairs.

Since we have reduced the number of public use brochures that we have available, there would be a corresponding decrease in the amount of services it would take.

[The material follows:]

Once a publication receives primary distribution, the Document Registry and Secondary Distribution System serves as the primary mechanism through which DOE manages and controls publications inventory, stock level and distribution history as well as distributes non-technical documents available free to the general public on request. As a result of the Paperwork Reduction Act and OMB guidelines in Circular 81-16 the numbers of items in the registry have been greatly reduced. Since further reductions are anticipated in fiscal year 1984, the activity will be discontinued at its present level. The activity could be reinstituted at a lower level should an examination of programmatic need prove it necessary to the department.

Mrs. **Bouquard**. Thank you. I notice also you are requesting a decrease of $15.4 million. Are there any specific energy programs that you are looking to cut back on?

Ms. **Hesse**. On management and administration?

Mrs. **Bouquard**. Yes.

Ms. **Hesse**. No, those are primarily—they are directly related to the number of personnel that would be required, decreasing personnel.

Mrs. **Bouquard**. Although the Policy and Management account was not specifically addressed in your testimony, we would like to understand the proposed reductions in the Office of Energy Research. I think there is about a $735,000 funding reduction for this office. Then it says a decrease maybe of 18 to 8 full-time employees. Is that correct?

Ms. **Hesse**. Yes. Generally, the reduction in policy and management for the various programs that are funded in that account is proportionate to what we see as the decrease in our requested level of funding. If we have fewer programs we would need fewer managers.

Mrs. **Bouquard**. Mr. Chiles, in January, 50 people from the PPA Office were detailed to the Office of Nuclear Waste Management.

When are they coming back to the PPA Office, and who is doing their work while they are gone?

Mr. CHILES. Two of the people have already returned. As we have need for them in the Policy Office and we can release them from the nuclear waste program, they will come back. I believe the details, Madam Chairman, will be finished on April 16. But, if these people need to be detailed a second time, they certainly will be. You and I both realize, I think, how important it is that this nuclear waste bill be put into place and the dates met. We are flattered that they look to the Office of Policy to make sure the bill is successfully implemented. We have very competent analysts whom we were able to put on the project on a temporary basis, just to see it through.

Mrs. BOUQUARD. I would like to pursue that a little further, Mr. Chiles. Really, I think we have very capable people in the Department of Policy for nonnuclear energy. But do they have the same capacity to work on the repository?

Mr. CHILES. Yes, they do. In fact, a lot of the people work in parallel areas. For example, Madam Chairman, I have people in the environmental area who are very adept at working with these people now on the environmental aspects of putting these sites into place. I have people in the fossil group who went there who are, by background and training, geologists, obviously very useful there as well. One of the things I have always found, and am very proud of in my organization, is I really have people who are kind of the jack-of-all-trades-type who, once you give them a particular project to work on, can very quickly get up to speed. They have done this, I think, very effectively.

Mrs. BOUQUARD. What specific areas in the PPA Office are going to receive funding reductions?

Mr. CHILES. In the 1984 budget?

Mrs. BOUQUARD. That is right.

Mr. CHILES. As we said, this budget is based upon a merger with the Department of Commerce. At that point we would look at what is already available in the Department of Commerce in the policy area. We would also look at, in a concurrent assessment, the Secretary's wishes to have more of the policy lead shifted to the Assistant Secretaries and see what kind of role this forms for the Policy Office. I think the role will be shifted somewhat away from providing the actual policy leadership, if you will, to doing the research and oversight areas for the Secretary.

Mrs. BOUQUARD. I have another concern about the PPA Office. This office has worked on an electric utility study, which I understand has been in draft for several months now. What is the status of this report? When do you expect it will be finalized?

Mr. CHILES. At this point we are working on two projects. We are working on a discussion paper we expect to have finished by April 15 to circulate within the public domain to have people comment on what they think about what we have found out so far. To back this up, we are also coming out with what you might call a study of what the studies told you. As you are probably well aware, we did almost 30 studies of different aspects of the electric utility field. We are now working on a book that tells you from our standpoint what we think all of these studies tell you.

At present, we are in the second draft. It is about 240 pages long, which is about four times what I expected. It is obviously going to have an executive summary as well. We also expect to have that book ready to be published by April 15. This will tell you, I think, very succinctly what we see as the problems in this industry, and what we see as potential places where the Federal Government might be able to help, without undertaking the next step and drawing any prescriptions at this point.

Mrs. BOUQUARD. Very good. So the funding reduction will not have any impact on this study?

Mr. CHILES. No ma'am, it will not.

Mrs. BOUQUARD. You have requested personnel reductions for the Operations Offices of 289. What functions are going to be reduced or eliminated in each of these Operations Offices?

Ms. HESSE. Madam Chairman, we believe that the request for staffing for the operations offices generally follows our request for program money and at the point that we have a budget that is approved by Congress for 1984, we will then divide among various Operations Offices the money and can tell at that point specifically the personnel required, if there would be additions, for example, or reductions.

Mrs. BOUQUARD. You have to look at that further down the road?

Ms. HESSE. Yes.

Mrs. BOUQUARD. Can you provide us with the level of contracting at each operations office, the number of contracts and total dollars?

Ms. HESSE. Yes.

[The information follows:]

House Science & Technology Cmte.
March 14, 1983
Page 16, Line 360

INSERT FOR THE RECORD

Mrs. Bouquard. Can you provide us with the level of contracting at each operations office, the number of contracts and total dollars?

Ms. Hesse. The level of contracting at each operations office is contained on a table I would like to insert for the record.

(The information follows:)

Multi-Purpose Operations Offices
FY 1982 Contracting Level 1/
(dollars in millions)

	Number of Contracts	Obligations
Chicago	3,366	$1,225.2
Idaho	521	433.4
Oak Ridge	624	3,048.5
Richland	298	768.0
San Francisco	665	1,065.5
Total	5,474	$6,540.6

1/ Includes new and active awards for GOCO's, contracts, grants, and cooperative agreements. Does not include interagency agreements, loans, and loan guarantees.

Mrs. BOUQUARD. We are very happy Mr. Walker is with us today. I think I saw Mr. Lowery. Would you like to submit a statement?

Mr. WALKER. Thank you. I do have some questions. Thank you very much.

Do I understand that one of the assumptions in your presentation is the fact that as of fiscal year 1984 there no longer will be a Department of Energy?

Ms. HESSE. Yes.

Mr. WALKER. Yes?

Ms. HESSE. Yes.

Mr. WALKER. As far as I am concerned that is good.

Ms. HESSE. There are valid and critical energy programs. The defense programs, strategic petroleum reserve and energy R&D; these programs will continue and must be well-managed regardless of where they are housed, in which Cabinet department they exist. The only area that has any chance of being affected by such a reorganization and merger would be in the area of support, particularly in the areas of management and administration and congressional affairs.

The budget does indeed say these estimates are based on a merged Department, and it is also true that they have not yet submitted legislation.

Mr. WALKER. That was the followup question. While I may agree with that as an assumption in terms of the goal we want to seek, I am a little concerned about making that assumption based upon the realities of the political and legislative process.

Do you have some assurances that that is an appropriate assumption within which the subcommittee can work?

Ms. HESSE. Certainly, if the last reorganization proposal is representative, there is not overwhelming support in Congress for a reorganized Department.

Mr. WALKER. So the follow-on question of that is, if the assumption is that you are reducing the personnel in management on the idea that it is a part of a phaseout of the Department, does it follow that if we can't realistically see a phaseout of the Department down the road that we should still continue with this phaseout of personnel? Can the Department still do its job with the phase-down of personnel, not having the assumption of no Department by fiscal year 1984?

Ms. HESSE. If there is no reorganization legislation passed by Congress, we will try to effectively manage our programs within the resources that we have requested, but we will reevaluate our needs and, if necessary, submit additional funding requirements.

Mr. WALKER. So within the context of your proposal you do think there might be a need for a supplemental appropriation at some point in order to staff the Department adequately if, in fact, we are not moving toward a phaseout of departmental activities?

Ms. HESSE. That is a clear possibility.

Mr. WALKER. We have heard a great deal about your decentralization plans. Would you comment a little bit on decentralization and how the funding proposal that you have before us would be affected by or would affect decentralization?

Ms. HESSE. By decentralization I assume you mean decentralization to the operations offices?

Mr. WALKER. That is right.

Ms. HESSE. I think our budget request for 1984 does not presume that there would be any more decentralization. I think that we believe that we have placed in the operations offices the functions that should be there. We would not propose to push any more out to the field.

Mr. WALKER. So there is no assumption in this proposal for further movement of programs out of Washington into the regions?

Ms. HESSE. That is correct.

Mr. WALKER. That is correct?

Ms. HESSE. As far as the administration is concerned, yes.

Mr. WALKER. All right. You have also done some fairly extensive work in the area of contracting out. Does the proposal we have before us assume there will be additional efforts in that area?

Ms. HESSE. I think the proposal for departmental administration assumes that we will have a sufficient level of procurement representatives to work on the level of program funding we have requested.

Mr. WALKER. I am talking about principally holding programs inhouse versus putting them out to independent contractors or independent consultants. There has been a considerable movement of activity in that direction.

Ms. HESSE. You mean contracting government services to the private sector?

Mr. WALKER. Right.

Ms. HESSE. We would certainly hope, particularly in the area of departmental administration, to do more studies in 1984, 1983 also, to contract out more services to the private sector.

Mr. WALKER. Do you believe, based upon work that was done last year with regard to personnel and appropriate funding levels, that appropriate steps have been taken to assure that adequate personnel are now on board to do the work which has been mandated by this subcommittee and by others?

Ms. HESSE. I believe that in the area of departmental administration, indeed, we do now have adequate manpower.

Mr. WALKER. One final question, then. What is your projected level of difference between the numbers of people that might be needed if the Department continues, and what is in your funding request, assuming a phaseout? How much additional manpower are we probably talking about? How many additional dollars?

Ms. HESSE. I cannot give you a specific statement based on how much more we will need if, indeed, we do not merge with another Department. We think that that is someplace in the distance, that we have assumed that we will reorganize, and that if we don't, we will reevaluate our requirements at that point.

Mr. WALKER. Are we talking about significant funding? I am trying to get a perspective. In other words, at some point around here some of us are going to be called upon to defend the proposal that you put up here for reorganization. The only real defense of that proposal, and as I say, I think it is a good defense, is the fact that it is going to end up saving us some money.

I guess, really, the bottom line of my question is, how much is it going to save us?

Ms. HESSE. That is a question I would like to be able to answer for you. But until we have a reorganization proposal, until we know what organizational structure is proposed and how that organizational structure will work and how Energy would merge into another Department, it was impossible for us to say how much more or less we would need.

Mr. WALKER. That is fair enough.

Thank you, Madam Chairman.

Mrs. BOUQUARD. Thank you very much, Mr. Walker.

Mr. Bateman?

Mr. BATEMAN. Thank you, Madam Chairman.

Ms. Hesse, as I understand the burden of your comments, you anticipate there will be some reductions in level of required funding whether or not there is the combination of the Departments. But even if that does not emerge, there would be some, but lesser, savings in the administrative overhead functions?

Ms. HESSE. I would certainly hope so.

Mr. BATEMAN. That is certainly an encouraging thing to hear. Let me ask, in view of the lesser funding request and the economics, are any reductions in force contemplated? Or will this be something to the extent that personnel reduction is handled through attrition? What do you contemplate there?

Ms. HESSE. Of course, we have to wait and see what the final program funding levels are before we can say what our staffing requirements are. But the overall decrease in personnel in 1984 is about 5 percent, Departmentwide. Attrition has been running historically in DOE about 15 percent. First quarter of 1983 it was 10 percent. Certainly, we would hope that we would not have to RIF. We, certainly, have no RIF's planned, but that we could achieve those lower levels through attrition.

Mr. BATEMAN. Thank you very much. Those are all the questions I have, Madam Chairman.

Mrs. BOUQUARD. Thank you very much, Mr. Bateman.

In the congressional and public affairs category, what are we cutting out here?

Ms. HESSE. Those numbers are, of course, based on a reorganized or merged Department. If that does not happen, I think that, clearly, that area will need more personnel. We are also hoping that they can achieve certain efficiencies through streamlining their operations.

Mrs. BOUQUARD. As far as our public information activities, our visitors centers and our museums, our national laboratories, and so forth, I think they, certainly, serve a very worthwhile, very important function in seeing that we do have the proper information on nuclear power and solar power, and in understanding the technologies of what we are doing in coal research, for instance. I think they are certainly very valuable services of the Department. And I would not like to see these programs cancelled. I think public information is a very vital service in this regard.

Ms. HESSE. I agree, and I believe that the museums, and so on, are funded through the programs. Yes; they are funded through the programs and would not be included in departmental administration.

Mrs. BOUQUARD. I was concerned about that. The Office of Competition, are you zeroing out that Office?

Ms. HESSE. No; we are not going to zero out the functions of the Office. We do not propose to have a separate staff to handle the functions of competition, but the mandated requirements would continue in other areas in congressional affairs.

Mrs. BOUQUARD. Very good. You requested four FTE's for the Office of Consumer Affairs, but you didn't request any funding. Would that be for salaries, or don't you need support money, such as for travel?

Ms. HESSE. The 1984 budget contemplates we would continue those activities but at a reduced level. The level of activity would be about half what it is now. The contractual support we would propose to eliminate. That was about $100,000 in 1983.

Mrs. BOUQUARD. You do have sufficient funding for the four FTE's you requested?

Ms. HESSE. I believe so, yes.

Mrs. BOUQUARD. Mr. Sensenbrenner is here.

Mr. Sensenbrenner?

Mr. SENSENBRENNER. Thank you very much, Madam Chairman. I have no questions, but ask unanimous consent that an opening statement of mine appear in the record immediately following that of the chairman's.

Mrs. BOUQUARD. Without objection. We have already given you permission to put your opening statement in the record.

One final question. Your Energy Research Advisory Board has commented that the Department is not doing as much as they could to set an example for energy conservation within your facilities. Yet, in your budget request you decreased funding for in-house energy management by $1.6 million, with the largest decrease coming from modifications for energy management. If we save money now by not retrofitting small projects, is this really wise? Aren't we going to have to pay a little more for it later on?

Ms. HESSE. One of the requirements or criteria we used this year was an internal rate of return at a certain level. Also, that these projects have a payback within 1.8 years. Frankly, some of the projects fell by the wayside simply because of the general fiscal constraint that we felt we need to follow in this year's budget request.

Our goals develop from legislation and from an Executive order. Our goal was to have a 20-percent reduction in building consumption by 1985. We have achieved over 14 percent of this in fiscal year 1982. So, I think, we are well on our way and will be able to meet our goals.

Mrs. BOUQUARD. As a followup, when we were talking about the information center, you stated that you are planning to dispense with some of the publications. Would you supply this committee, not with all of them certainly, but a typical sample of what you are planning to cut out?

Ms. HESSE. Yes.

[The information is available in committee files:]

Mrs. BOUQUARD. Also, since we do have some members that aren't here today, we hope that you would agree to answer questions. We would submit them to you in writing.

Ms. HESSE. Absolutely.

Mrs. **Bouquard**. My last question. I know that, in the paper, Saturday I believe, that President Reagan signed an Executive order that would require lie detector tests of some of the Federal employees under certain circumstances.

What role will your Office play in instituting this order?

Ms. **Hesse**. My Office will not play any role. All security clearances and investigations are handled by defense programs and we discussed that at a staff meeting this morning with the Secretary. They are currently reviewing what requirements there would be for DOE.

Mrs. **Bouquard**. Thank you very much. I think this is the shortest subcommittee meeting on record. Certainly, the shortest one that I have attended as a member of this committee. We do thank you for being with us today, and look forward to seeing you more in the future.

If there are no further questions from members, I would like to announce that the next meeting of the EDA Subcommittee will be tomorrow at 2 o'clock in 2318. The next meeting of our ERP Subcommittee will be Wednesday at 2 o'clock in 2325.

If there is no further business, the subcommittees stand adjourned.

[Whereupon, at 2:30 p.m., the subcommittees were adjourned, to reconvene subject to the call of the Chair.]

[Questions and answers submitted for the record follow:]

Department of Energy
Washington, D.C. 20585

April 27, 1983

Honorable Marilyn Lloyd
Chairman
Subcommittee on Energy Research
and Production
Committee on Science and Technology
House of Representatives
Washington, D.C. 20515

Dear Ms. Lloyd:

On March 14, 1983, Assistant Secretary Martha O. Hesse appeared before the Science and Technology Subcommittee on Energy Research and Production to discuss the Department of Energy's Fiscal Year 1984 budget.

Following that hearing, you submitted written questions for responses to supplement the record. Enclosed are the answers to those questions.

If you have any questions, please call Cathy Carey or Tom Pretorius of my staff on 252-4277. They will be happy to assist you.

Sincerely,

Thomas H. Pretorius
for Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosure

FOLLOW-UP QUESTIONS AND ANSWERS

Resulting From The

MARCH 14, 1983, HEARING

Before The

ENERGY RESEARCH AND PRODUCTION SUBCOMMITTEE

SCIENCE AND TECHNOLOGY COMMITTEE

U.S. HOUSE OF REPRESENTATIVES

WITNESSES: MARTHA HESSE AND HUNTER CHILES

General Policy

Question: Your budget submission indicates $13.2 million in unapplied plant and capital equipment funds for Fiscal Year 1983 as a result of the continuing resolution. How do you intend to allocate these funds within the account?

Answer: The Department is currently reviewing various options to utilize these funds within the account or by an appropriation transfer.

Management and Administration

Question: Miscellaneous Revenues seem to have increased considerably over the last 3 years. On what do you base the estimates for revenues for FY 1983 and FY 1984 and can they be counted on to increase annually?

Answer: Over the last three years there has been a considerable increase in the estimated revenues. Generally this increase results from a combination of two factors. First, there has been an increase in demand by outside users for our specialized products and services which earn revenues and second, from increases in the prices charged by the Department for its products and services. The FY 1983 and FY 1984 revenues are based upon our current estimate of the demand from outside users of our products and services.

Being able to count on continued revenue increases in the future is dependent upon continued high demand along with inevitable sales price increases. Demand for our products and services is dependent upon factors outside the control of the Department. Some products and services are sensitive to changes in the overall national economy; unpredictable upturns or downturns in segments of the economy cause unscheduled shifts in demand. Any projection of continued annual growth in revenues would be highly speculative.

Congressional, Intergovernmental and Public Affairs

QUESTION: Are all DOE information activities funded through Congressional and Public Affairs?

ANSWER: No, most DOE information activities are funded by program offices. The Office of Public Affairs reviews, coordinates and approves all publications, audiovisual productions and exhibits developed and used for public dissemination of information. The FY 1984 Congressional, Intergovernmental and Public Affairs budget request includes a total of $150,000 for necessary support services and evaluations.

QUESTION: If the proposed merger does not occur, what will be required to maintain the Congressional and Public Affairs Office at an adequate level?

ANSWER: In response to a request from Chairman Bevill of the House Appropriations Subcommittee on Energy and Water Development, we are currently reviewing our requirements in this area. That review has not yet been completed, so I cannot give a definitive answer at this time.

Operations Offices

Question: Please provide us with the level of contracting at each Operations Office in terms of numbers of contracts and total dollar amount.

Answer: The Department had the opportunity to provide this information when editing the transcript, and included it as an Insert for the Record at page 16.

Technical Information Services

Question: What specific activities will be delayed or terminated as a result of the $1.153 million reduction from FY 1983? Please provide several examples of the consumer brochures which will no longer be distributed by the TIS program.

Answer: The Department had the opportunity to provide this information when editing the transcript, and included it as an Insert for the Record at page 26.

Policy, Planning and Analysis

Q. What capabilities remain in the Department to frame policy for non-nuclear energy, particularly conservation and renewables?

A. The Department has sufficient capabilities in policy functions for all areas of energy, including conservation and renewables.

Policy, Planning and Analysis

Q. The PPA staff is charged with coordinating energy related policy analysis, policy guidance and carrying out Congressionally mandated studies. The PPA staff is aided by contractors, universities and the National Laboratories. What percentage of PPA work is performed outside DOE?

A. It is not possible to precisely estimate the percentage of work performed by PPA staff on the one hand and by contractor assistance on the other.

The level of contractor assistance varies significantly depending on the particular area and type of analysis involved, the types of service requested and the product(s) needed. In terms of the budget request, it also is important to understand that contractor-assistance obtained by PPA covers a wide variety of specialized services, ranging from specific analytic tasks, to time-sharing of energy data bases, to support services for production activities related to publication of documents authored by PPA.

Policy, Planning and Analysis

Q. You have asked for a decrease of $3.9 million for the PPA Office. What specific areas will receive funding reductions?

A. Allocation of funds within PPA will not be determined by identifying specific areas for funding reductions. Rather, funds will be allocated on the basis of priorities consistent with current energy policy issues and Department requirements. In FY 1984, these may include assessments of natural gas markets, oil markets, energy projections and forecasting, strategic planning, electric utility analysis, environmental issues, and issues that cut across energy areas and/or Departmental or agency organizational lines.

Q. With a proposed personnel reduction of 45 and a funding reduction of $3.9 million, how will you determine the priority of work?

A. Priorities will be determined on the basis of current energy policy questions, analytic supported required by DOE line organizations, strategic planning process requirements, and the need for coordination and oversight related to cross-cutting issues.

DOE/MA-0064/1
VOLUME 1 OF 7

CONGRESSIONAL BUDGET REQUEST
FY 1984

VOLUME 1

ATOMIC ENERGY DEFENSE ACTIVITIES

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

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DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	---	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities ..	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration ...	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration .	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration .	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration .	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund .	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	---	-3,331	---	-5,000	---	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	---	---	217,325	179,481	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	---	2,200	2,100	2,100
Special Foreign Currency	---	312	---	---	---	---
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,081	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	---	39,213	---	23,491	---	---
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

ATOMIC ENERGY DEFENSE ACTIVITIES

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV		1	1
EXECUTIVE LEVEL V			
SUBTOTAL		1	1
ES-6			
ES-5	10	12	12
ES-4	41	47	47
ES-3	19	20	20
ES-2	9	10	10
ES-1	8	9	9
SUBTOTAL	87	98	98
GS-18			
GS-17			
GS-16	1	1	1
GS/GM-15	167	183	193
GS/GM-14	256	305	333
GS/GM-13	317	383	419
GS-12	173	207	235
GS-11	108	128	150
GS-10	5	8	7
GS-9	162	185	198
GS-8	30	39	45
GS-7	218	235	263
GS-6	187	221	276
GS-5	192	240	273
GS-4	55	70	71
GS-3	35	39	40
GS-2		2	
GS-1		2	1
SUBTOTAL	1,906	2,248	2,505
UNGRADED	21		
TOTAL PERMANENT POSITIONS	2,014	2,347	2,604
UNFILLED POSITIONS, END OF YEAR	4		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	2,010	2,347	2,604

DEPARTMENT OF ENERGY

Proposed Appropriation Language

[Atomic Energy Defense Activities, Operating Expenses]

[Atomic Energy Defense Activities, Plant and Capital Equipment]

Atomic Energy Defense Activities

[Provided further, That Department of Energy Atomic Energy Defense Activities, shall be funded at not to exceed an annual rate for new obligational authority of $5,700,000,000, of which not more than $4,372,000,000 shall be available for operating expenses and not more than $1,328,000,000 shall be available for plant and capital equipment, except that no funds shall be available for Project 82-D-109:]

For expenses of the Department of Energy including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for atomic energy defense activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 333 of which 323 are for replacement only) including 7 police-type vehicles; purchase of one helicopter, $6,778,075,000, to remain available until expended.

Explanation of Change

Proposed language replaces provisions contained in the FY 1983 continuing resolution. New language will merge the operating expenses and plant and capital equipment accounts into one account.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
ATOMIC ENERGY DEFENSE ACTIVITIES
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$ 5,700,000	$ 6,778,075
Comparative Transfer From:		
Nuclear Energy - OE	3,700	---
Subtotal	3,700	---
Subtotal, Budget Authority	5,703,700	6,778,075
Receipts and Reimbursements:		
Offsetting Collections from Federal Funds	879,336	1,215,000
Unobligated Balance, Start of Year	453,629	50,000
Unobligated Balance, End of Year	-50,000	---
Total Obligations	$ 6,986,665	$ 8,043,075

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ATOMIC ENERGY DEFENSE ACTIVITIES

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Inertial Confinement Fusion	209,062	189,750	151,800
Research and Development and Testing	1,103,280	1,184,800	1,380,080
Production and Surveillance	1,596,733	1,900,900	2,337,315
Program Direction - Weapons	47,258	50,091	55,930
Verification and Control Technology .	52,000	53,900	61,650
Materials Production	955,612	1,202,760	1,485,300
Defense Waste and By-Products Management	373,893	518,729	611,500
Nuclear Materials Safeguards and Security	47,219	47,360	52,000
Naval Reactors Development	495,920	526,910	613,000
Security Investigations	23,600	28,500	29,500
Total, Atomic Energy Defense Activities	4,904,577	5,703,700	6,778,075

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
Atomic Energy Defense Activities

The Department's Atomic Energy Defense Activities include seven programs. The goal of these programs is to accomplish research and development, testing, production, data collection and evaluation, defense, security and nonproliferation activities. The seven programs are summarized below.

Naval Reactors Development

The naval reactors development program carries out nuclear propulsion development work essential to the United States Navy and for maintaining the security of the United States. Nuclear propulsion provides the Navy with ships having virtually unlimited high speed endurance and freedom from the logistics umbilical cord for propulsion fuel. This greatly reduces vulnerability to enemy action and allows ships to be designed with a greatly increased capability for sustained combat operations. The program provides for the design, development, testing, and evaluation of improved naval nuclear propulsion plants and reactor cores having long fuel life, high reliabilty, improved performance and simplified operating and maintenance requirements. The nuclear propulsion plants and cores cover a wide range of configurations and power ratings suitable for installation in naval combatants varying in size from small submarines to large surface ships. The ultimate objective is to develop reactor cores that will last the lifetime of the ship. In FY 1984, the ongoing research, development and test efforts will continue. The FY 1984 budget request also includes funds for the purchase of enriched uranium used in manufacturing reactor cores required for the nuclear powered ships of the U. S. Navy.

Weapons Activities

This program provides for the research, development, engineering, testing, and production of all U.S. nuclear weapons; maintenance of reliable weapons for their stockpile life; and retirement and disposal of nuclear weapons from the stockpile. In FY 1984, the weapons program will continue to provide new technology to maintain a modern nuclear force, along with the design and development of new weapon systems in response to defense requirements. Increases are provided for continued production of weapon systems.

In FY 1984, the research, development, and testing effort will continue to explore and provide technologies necessary to maintain the United States nuclear forces and design and develop new weapon systems in response to defense requirements. Major objectives in the research, development, and testing area include maintaining the capability to design, test, and certify new weapons required for national defense; advancing the state-of-the-art of nuclear weapons technology to assure that the United States is in the forefront of all technological initiatives, and monitoring the nuclear weapons stockpile to assure continued reliability and effectiveness. Included in FY 1984 is a major initiative designed to revitalize the weapons program testing complex.

The inertial confinement fusion program will continue efforts to obtain the physics understanding required for determining the beam energy and target design requirements for high energy gain. Greater emphasis will be placed upon the near-term application of this technology to nuclear weapons physics utilizing existing experimental facilities as well as new facilities expected to become operational in the near-term timeframe. In FY 1984 the budget supports utilization of the ANTARES facility in support of the gas laser program and maintains the FY 1983 level of effort in the pulse power program. Funding is provided to support NOVETTE experiments.

The major objectives of the production and surveillance program are to produce and deliver new warheads, projectiles, and bombs for the United States nuclear weapons stockpile; to provide and maintain modern manufacturing capabilities and capacities required for future production of weapons for enhancement of United States nuclear forces; and to maintain the United States nuclear weapons stockpile in a high state of readiness and reliability. The FY 1984 program supports the requirements of the Nuclear Weapons Stockpile Memorandum approved by the President.

Verification and Control Technology

The goal of this program is: to conduct the research, development, test, and support activities related to the detection of nuclear test activities in response to treaty verification and national security requirements; to provide the Department's expertise to significant nuclear intelligence, export control and arms control issues; and to review export license applications as required by the Atomic Energy Act as amended, the Nuclear Non-proliferation Act of 1978 and the Export Administration Act of 1979. The FY 1984 budget request emphasizes the fabrication, demonstration and deployment of both research and operational verification systems.

Materials Production

The materials production program is responsible for providing nuclear materials for national defense, departmental research and development programs, other government agencies, industry and for the processing of naval reactor spent fuels. The FY 1984 budget will allow the Department to continue to operate necessary production and processing facilities, as well as support facilities. Activities begun in 1981 to increase materials production will continue, including the restart of L Reactor at Savannah River, PUREX reactivation and various restoration programs throughout the complex. Research and development efforts for long-term production alternatives will continue, including Special Isotope Separations technology. Efforts will continue to ensure that the production facilities will be operated in a safe, secure and environmentally acceptable manner.

Defense Waste and Byproducts Management

The goal of the defense waste and byproducts management program is to provide for safe interim storage or utilization of nuclear wastes and byproducts generated primarily from nuclear materials production and naval propulsion. In addition, the program also supports the development of technologies and facilities for the final disposal of defense nuclear waste.

Fiscal Year 1984 efforts will upgrade waste handling, storage, and disposal operations, construction of new facilities, improvement of facilities, and upgrading of burial ground operations. The long-term program in FY 1984 will focus on the construction of the Defense Waste Processing Facility (DWPF) at Savannah River, and preparation of transuranic waste at Idaho and other DOE sites for planned shipment to the Waste Isolation Pilot Plant (WIPP).

The Defense Waste Processing Facility (DWPF) will provide the final step in processing high-level waste for disposal. Facility construction will begin in FY 1984 leading to "hot" operations in FY 1989. The DWPF will immobilize the high-level waste (HLW) in borosilicate glass for storage, transportation to, and disposal in a geologic repository.

The Waste Isolation Pilot Plant, located near Carlsbad, New Mexico, is intended to demonstrate the safe disposal of defense nuclear waste. The WIPP facilities will be capable of routine operations to receive, inspect, package and emplace defense nuclear waste in a geologic disposal environment. Emplacement of radioactive waste in WIPP could begin in 1989.

Nuclear Safeguards and Security

This program is responsible for developing measures to assure adequate protection of the Department of Energy's nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage. The program also provides safeguards related technical support to U.S. and international activities designed to minimize the proliferation of nuclear weapons. The FY 1984 budget request will permit continuation of these vital program activities.

Security Investigations

The objective of the security investigations program is to insure that the common defense and security of the United States is protected by an adequate background investigation and screening of those DOE and DOE contractor personnel who would, in the performance of their work, need access to Restricted Data, National Security Information or Special Nuclear Material, or who would occupy a designated Critical Senstive position. Approximately 27,000 security investigations will be conducted in FY 1984.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

Weapons Activities

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DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
.TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,651
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	198	160	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,330	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,120	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,678	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX EMERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

Department of Energy
FY 1984 Congressional Budget Request
LEAD TABLE
Weapons Activities
Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Weapons Activities (DP)				
Research, Development, and Testing				
Operating expenses	$ 949,280 a/	$1,049,800 d/	$1,049,930	$1,190,380
Capital equipment	82,100	93,000	93,000	108,400
Construction	71,900	42,000	42,000	81,300
Subtotal	1,103,280	1,184,800	1,184,930	1,380,080
Inertial Confinement Fusion				
Operating expenses	122,362	140,000	140,000	127,100
Capital equipment	11,000	11,000	11,000	11,800
Construction	75,700	38,750	38,750	12,900
Subtotal	209,062	189,750	189,750	151,800
Production & Surveillance				
Operating expenses	1,278,433 b/	1,474,500 e/	1,475,183	1,779,715
Capital equipment	70,000	92,000	92,000	114,400
Construction	299,300	334,400 f/	334,400	443,200
Subtotal	1,647,733	1,900,900	1,901,583	2,337,315
Program Direction				
Operating expenses	47,258 c/	50,091 g/	51,714	55,930
Subtotal	47,258	50,091	51,714	55,930
Total				
Operating expenses	2,397,333	2,714,391	2,716,827	3,153,125
Capital equipment	163,100	196,000	196,000	234,600
Construction	446,900	415,150	415,150	537,400
Subtotal	3,007,333	3,325,541	3,327,977	3,925,125
Less $51 Million Congressional Reduction	-51,000	-	-	-
Total	$2,956,333	$3,325,541	$3,327,977	$3,925,125
Staffing-FTP/Total FTE's				
Research, Development, and Testing	164/ 166	172/ 172	172/ 172	173/ 173
Inertial Confinement Fusion	-	-	-	-
Production & Surveillance	598/ 601	625/ 635	625/ 635	677/ 689
Program Direction	832/ 872	806/ 848	806/ 848	848/ 888
Total	1594/1639	1603/1655	1603/1655	1698/1750

Authorization: Section 1, Public Law 83-703
Section 91, Atomic Energy Community Act of 1955

NOTE: Explanation of footnotes on following page.

Footnotes for Weapons Activities Lead Table

a/ Reflects transfer of $2,980,000 and 84 full-time equivalents from Weapons Activities Program Direction to more realistically align direct manpower to program. Includes $12,000,000 FY 1982 Supplemental. Reflects $6,800,000 allocation of the Congressional general reduction.

b/ Reflects transfer of $4,450,000 from Weapons Activities Program Direction for weapons-dedicated Albuquerque staff (124 full-time equivalents). Includes $277,000 Stores Inventory and $2,000,000 FY 1982 Supplemental. Reflects $9,700,000 allocation of the Congressional general reduction.

c/ Reflects transfer to Weapons Activities Program Direction of $900,000 for the immediate staff of the Assistant Secretary for Defense Programs from Management and Support (23 full-time equivalents); $9,335,000 for the Community Assistance Program from Intergovernmental Affairs (17 full-time equivalents); and $2,145,000 for regional office personnel from Management and Support (39 full-time equivalents). Reflects transfer from Weapons Activities Program Direction of $4,450,000 to Weapons Activities Production and Surveillance for weapons-dedicated Albuquerque staff (124 full-time equivalents); transfer of $2,980,000 and 84 full-time equivalents to Weapons Activities Research, Development, and Testing to more realistically align direct manpower to program; and transfer of $367,000 for 9 full-time equivalent auditors from the Albuquerque and Nevada Operations Offices to the Inspector General's office.

d/ Reflects transfer of $3,200,000 and 84 full-time equivalents from Weapons Activities Program Direction. Reflects $10,000,000 allocation of the Congressional general reduction.

e/ Reflects $4,600,000 allocation of the Congressional general reduction.

f/ Reflects $16,100,000 allocation of the Congressional general reduction.

g/ Reflects transfer of $3,200,000 and 84 full-time equivalents to Weapons Activities Research, Development, and Testing.

Department of Energy
FY 1984 Congressional Budget Request

Summary of Changes
Weapons Activities
(In thousands of dollars)

Weapons Research, Development, and Testing	
FY 1983 Appropriation enacted	$1,184,800
Built-in increases and decreases:	
Impact of October 1982 pay raise	+ 130
FY 1984 Base	$1,184,930
Program Increases and Decreases:	
Escalation for operating and capital equipment	$ + 84,950
Increase research and development employment from 7,870 to 7,950 and provide for increased procurements	+ 19,720
Increase computer leases	+ 6,380
Continue ramping up the number of nuclear device tests and provide preparations to sustain that buildup in FY 1985	+ 36,500
Increase capital equipment	+ 8,300
Increase general plant projects to slow deterioration	+ 11,300
Construction to improve safeguards and security	+ 1,300
Construction to begin testing revitalization	+ 38,500
Funding to support prior-year projects less general plant projects	- 11,800
FY 1984 Budget Request	$1,380,080

Inertial Confinement Fusion	
FY 1983 Appropriation enacted	$ 189,750
Built-in increases and decreases:	
None	0
FY 1984 Base	$ 189,750
Program Increases and Decreases:	
Escalation for operating expenses and capital equipment	$ + 10,600
Continue Particle Beam Fusion Accelerator-II; funding for NOVA completed in FY 1983	- 25,850
Transfer heavy ion effort to Office of Energy Research	- 2,000
Reduce experimentation, diagnostic development, and target fabrication	- 20,700
FY 1984 Budget Request	$ 151,800

Weapons Production and Surveillance

FY 1983 Appropriation enacted	$1,900,900
Built-in increases and decreases:	
Impact of October 1982 pay raise	+ 683
FY 1984 Base	$1,901,583
Program Increases and Decreases:	
Provide for escalation for operating expenses	$ +130,465
Provide for escalation for capital equipment	+ 8,500
Provide operating funding to accomplish new weapons production, maintain the existing stockpile, conduct process development activities, and continue a stockpile improvement program	+174,067
Continue effort to improve transportation safeguards equipment	+ 3,750
Continue effort to restore and slow the ongoing deterioration of utilities and equipment in the weapons complex	+ 89,250
Initiate construction of production facilities for the TRIDENT II warhead	+ 19,300
Initiate construction of production facilities for the Antisubmarine warfare/standoff weapon warhead production facilities	+ 17,600
Initiate construction of production facilities for the SENTRY warhead	+ 16,300
Initiate construction of production support facilities to support the long-term workload increases:	
- Consolidated nonnuclear manufacturing facility, Rocky Flats Plant	+ 24,100
- Electrical system expansion, Pantex Plant	+ 1,500
- Inert assembly and test facility, Pantex Plant	+ 1,500
- High explosive subassembly facility, Pantex Plant	+ 7,000
- Railroad track replacement and upgrade, Pantex Plant	+ 800
- Explosive component test facility, Mound Facility	+ 13,100
Initiate safeguards and site security upgrading, Rocky Flats Plant	+ 10,000
Continue or complete previously authorized construction projects	- 90,400
Increased funding to continue the acquisition of computer capability required to support the production complex	+ 8,900
FY 1984 Budget Request	$2,337,315

Weapons Program Direction

FY 1983 Appropriation enacted	$ 50,091
Built-in increases and decreases:	
Impact of October 1982 pay raise, pay ceiling increases, Federal Medicare contributions, and increased health benefits	+ 1,623
FY 1984 Base	$ 51,714
Program Increases and Decreases:	
Increase in Community Assistance Program	$ + 1,229
Increase of 40 full-time equivalents	+ 2,000
Increase in contractual services	+ 987
FY 1984 Budget Request	$ 55,930

The weapons program budget provides for essential effort required to support the development, testing, production, and lifetime surveillance of safe and reliable nuclear weapons to meet national defense needs. A related effort involving research in inertial fusion is also provided for in this budget because inertial fusion work is relevant to weapons research, particularly with respect to laboratory scale investigation of certain phenomena pertinent to weapons physics. Research, development, and testing activities in FY 1984 will be pursued in support of weaponization (development engineering - Phase 3) requirements related to the W79 warhead for the 8-Inch Artillery Fired Atomic Projectile, the W80 warhead for the Air and Sea Launched Cruise Missiles, the W81 warhead for the Standard Missile-2, the W82 warhead for the 155mm Artillery Fired Atomic Projectile, the B83 Strategic Bomb, the W84 warhead for the Ground Launched Cruise Missile, the W85 PERSHING II Missile Air Burst/Surface Burst warhead, and the Missile X warhead. This budget is structured to continue to increase the level of effort for the technology base while still being responsive to the near-term needs for weaponization. The research and development employment in the weapons laboratories is planned to increase by about 80 full-time equivalents.

The testing budget will support nuclear device tests in FY 1984 and allow for the preparation required to support the testing in future years. The level of testing effort will support tests related to the weaponization effort in the laboratories and tests for effort related to future requirements. Emphasis will continue to be placed upon the drilling of inventory emplacement holes for future testing and maintenance of the Nevada Test Site at more appropriate levels.

With regard to the inertial fusion effort, the funds requested in FY 1984 are required to support efforts to obtain the physics understanding required for determining the beam energy and target design requirements for target ignition. The data obtained by experiments accomplished in the next five or six years will permit a determination of the driver and target requirements for ignition, as well as provide the basis for weapon physics experiments and measurement of material properties of interest to the nuclear weapons program.

The budget also provides for the production of new nuclear weapons for the stockpile and for the surveillance and maintenance of existing stockpile weapons as approved by the President. Included are the full-scale production of the B61-3 and -4 bombs, the W76 warhead for the TRIDENT, the W79 warhead for the Artillery Fired Atomic Projectile, the W80-0 warhead for the Sea Launched Cruise Missile, the W80-1 warhead for the Air Launched Cruise Missile, the B83 Strategic Bomb, the W84 warhead for the Ground Launched Cruise Missile, and the W85 PERSHING II Missile Air Burst/Surface Burst warhead, and predelivery production effort for the W81 warhead for the Standard Missile-2, the W82 warhead for the 155mm Artillery Fired Atomic Projectile, and the Missile X warhead.

Reference is made throughout the budget to the weapons program phases that outline the functions and procedures which are followed in the "birth-to-death" cycle of a nuclear weapon. These phases were defined in a joint Atomic Energy Commission-Department of Defense agreement dated March 21, 1953. This agreement is still in effect, and the only significant change to this portion of the original agreement has been the addition of Phase 7.

The seven phases are:

Phase 1 - Weapons Conception
Phase 2 - Program Study or Feasibility Study
Phase 3 - Development Engineering or Full-Scale Development
Phase 4 - Production Engineering
Phase 5 - First Production
Phase 6 - Quantity Production and Stockpile
Phase 7 - Retirement

	FY 1983 Appropriation	FY 1984 Request
Research, development, and testing	$1,184,800	$1,380,080
OPERATING EXPENSES	$1,049,800	$1,190,380
Research and Development	641,500	714,480
Testing	408,300	475,900

This activity provides for the effort performed by the Lawrence Livermore National Laboratory; the Los Alamos National Laboratory; the Sandia National Laboratories; and other contractors in research, development, and testing of nuclear weapons including development, engineering, and certification of nuclear warheads requested and required by the Department of Defense for stockpile, investigation of concepts and technologies for future weapon applications, and advancement of the sciences and technologies germane to the weapons design process. Also included in this budget request are the costs associated with the operation of the Nevada Test Site and related costs incurred for the detonation of test devices. This activity also provides funding for the full-time equivalent of 98 Federal firemen at the Los Alamos National Laboratory and surrounding community; 8 couriers at the San Francisco Operations Office, 54 employees at the Los Alamos Area Office, and 13 employees at the Sandia Area Office. The following table presents the weapons research, development, and testing operating funding by organization.

	FY 1983 Appropriation	FY 1984 Request
Lawrence Livermore National Laboratory	$ 235,200	$ 262,000
Los Alamos National Laboratory	215,500	243,600
Sandia National Laboratories	316,500	354,000
Nevada Operations Office	270,700	317,200
Other	11,900	13,580
Total Weapons researcn, development, and testing	$1,049,800	$1,190,380

The basic product of the research, development, and testing effort is the generation of new ideas in weapon concepts and technologies and the application of these elements to continuing, new, or evolving Department of Defense requirements in a timely, efficient, and economical manner. The request for research, development, and testing for FY 1984 supports efforts to maintain and improve the weapons technology base; weapons development, engineering, and certification activities; testing capabilities; and special projects. Laboratory research and development employment and the level of underground nuclear device tests represent approximate indicators of the levels of effort being devoted to these activities. However, the level of employment and the number of device tests in a given fiscal year may vary as a function of several factors, including the number and nature of development engineering programs in progress, the types of technologies being developed for future systems, the results of prior-year underground device tests, complexity of tests, and the mix of resources (labor, procurements, and other costs) required to accomplish these activities. It is expected that the requested funding will support a modest growth of approximately 80 full-time equivalents in research and development and the continued ramping up of the number of nuclear device tests.

The following table summarizes and compares the FY 1984 level of effort and the program that can be accommodated within the request.

	FY 1983		FY 1984	
	R&D Employment		R&D Employment	
	Direct	Total	Direct	Total
Weapons technology base	1,900	3,695	1,935	3,770
Weapons development, engineering, and certification	1,685	3,660	1,680	3,650
Testing capabilities	25	45	30	50
Special projects	255	470	260	480
Total	3,865	7,870	3,905	7,950

The request supports a continuation of the Department of Energy's plan to reinvest in the nuclear weapons science and technology base. During the past decade, the majority of the limited research, development, and testing resources were devoted to meeting the near-term requirements for development, engineering, and certification of new warheads for the Department of Defense. As a result, the resources available for the weapons technology base efforts were greatly reduced. Reductions in the technology base area lead ultimately to an erosion of the foundation upon which future weapon systems are built. To correct this situation, a phased buildup of the weapons technology base activities began in FY 1981 with the initial goal of increasing research and development employment and underground nuclear testing.

Funding constraints have forced adjustments in this plan, and it now appears that the goal will not be reached until after FY 1987. The modest increase in research and development employment planned in FY 1984 will be used principally to support technology base efforts. There will be a small decrease in development, engineering, and certification, an increase in testing capabilities to support the higher level of testing, and an increase in special projects to provide more adequate safeguards and emergency response capability. The request provides for a modest increase in the level of testing and in the amounts of diagnostics fielded and data retrieved per test.

Technology base research, development, and testing activities provide the fundamental scientific, engineering, and facility capabilities upon which this Nation's nuclear weapons development, engineering, and certification efforts are based. The primary emphasis in this area is on providing an inventory of proven ideas and concepts for timely and effective application to evolving Department of Defense system requirements; the conduct of basic studies in unique areas of physics, mathematics, chemistry, and the engineering sciences that will provide tomorrow's breakthroughs in nuclear weapons technology; and the maintenance of a central core of facilities and capabilities unique to nuclear weapon design. Consistent with the Department's investment strategy for the eighties, funding for technology base activities has been increased significantly for FY 1984 to better provide for the needs of the future. In FY 1984, approximately $476,800,000 will be devoted to technology base activities.

Efforts within the technology base category include:

1. Advanced concepts - Develops design and component technology with potential for future Department of Defense systems applications. Emphasis will continue in areas where experimentation is expected to provide significant payoffs during the intermediate term. However, increased effort will be expended on investigations of concepts having longer term payoffs as well.

2. Supporting research - Includes those program areas of physical and engineering science and technology that are fundamental to weapon development but where an existing lack of understanding limits the ability of the designer to develop an analytical or engineering model. Included under supporting research are most of the disciplines associated with the physical, chemical, mathematical, and engineering sciences. While the potential payoff of supporting research is not always as obvious as that in advanced concepts, it is an essential ingredient of the technology base effort.

3. Supporting technologies - Includes those activities related to improved utilization of laboratory experimental facilities and capabilities; increased understanding of advanced materials and their potential applications; development of processes to formulate and fabricate new materials; and the development and application of computer codes to understand and interpret the physics of nuclear devices and to analyze and predict the response of engineering materials and structures to various environments. These activities provide the bridge between research activities and advanced concepts and all must move forward in a balanced effort to develop the technology base.

Nuclear device tests will be conducted at the Nevada Test Site in support of the laboratory efforts mentioned above. These tests represent an integral element in confirming the feasibility and practicality of the ideas and concepts developed in the technology base category.

Weapons development, engineering, and certification activities are guided by current national requirements for providing new strategic nuclear weapon options, for modernizing tactical nuclear weapons, and for monitoring and maintaining the reliability of all nuclear weapons now in stockpile. All Phase 3 requests for weaponization or development engineering programs are transmitted formally by the Department of Defense to the Department of Energy through the Military Liaison Committee. Approximately $447,000,000 will be allocated to weapons development, engineering, and certification efforts in FY 1984.

Weapons development, engineering, and certification activities for FY 1984 will include the following programs:

W80 Cruise Missile Warhead

The W80 warhead is planned as a common warhead to be used with the Navy's Sea Launched Cruise Missile (W80-0) and the Air Force's Air Launched Cruise Missile (W80-1).

W81 Standard Missile-2 Warhead

The W81 provides a nuclear warhead for the Navy's Standard Missile-2 for defense against nuclear-armed air, surface, and submarine launched cruise missile threats. The TERRIER and AEGIS systems will accommodate the nuclear Standard Missile-2.

W82 155mm Artillery Fired Atomic Projectile Warhead

This modernized projectile will replace the W48 155mm projectile currently in the stockpile.

B83 Strategic Bomb

The B83 bomb provides a modern high-yield bomb to replace aging B28 and B43 bombs.

W84 Ground Launched Cruise Missile Warhead

The W84 provides a warhead for the Ground Launched Cruise Missile. Designed for in-theater use, it incorporates insensitive high explosive and other improved safety features and the latest command and control technology.

W85 PERSHING II Missile Air Burst/Surface Burst Warhead

The PERSHING II system will replace the currently deployed PERSHING Ia missile equipped with the W50 warhead. It upgrades the range and accuracy of the PERSHING Ia.

W87 Missile X Warhead

The W87 warhead is designed for application in the Missile X system. The announced initial operational capability of the Missile X system is October 1986.

SENTRY Warhead

The SENTRY nuclear warhead will provide an endoatmospheric defense capability for ICBM silos as well as SENTRY components.

TRIDENT II Warhead

The TRIDENT II warhead will be designed for the Sea Launched Ballistic Missile force. The warhead/reentry body configuration will be optimized to enhance the capability of the weapon system.

The following systems will continue in or are expected to enter Phase 2 feasibility study status during FY 1984:

Surface and Air Delivered Antisubmarine Warfare Weapon
Advanced Mobile Intercontinental Ballistic Missile
Corps Support Weapon System
New Strategic Air Launched Missile
Subsurface Delivered Antisubmarine Warfare Standoff Weapon

Phase 1 conceptual studies are expected to be ongoing during FY 1984 for the following systems:

Advanced Tactical Air Delivered Weapon
Bomber Defense Missile
Advanced Cruise Missile Technology Warhead

Testing capabilities category encompasses those activities necessary to maintain and enhance capabilities for conducting nonnuclear laboratory scale and field experiments and for conducting full-scale underground nuclear device tests at the Nevada Test Site. Included in this category are efforts directed toward: (1) improving the technology in all areas of testing that are relevant to the nuclear weapons program, (2) the conduct of environmental and safety programs at the Nevada Test Site to assure that all nuclear device tests are executed in a safe and environmentally acceptable manner, (3) overall maintenance and operation of the Nevada Test Site, (4) provision of logistical support to the laboratories and other technical organizations that participate in test activities at the Nevada Test Site, (5) preparatory activities for future testing at the Nevada Test Site, and (6) surveillance and assessment activities from past atmospheric testing. In FY 1984, program and funding requirements permitting, increased emphasis will continue to be placed upon the drilling of inventory emplacement holes for future testing and the maintenance of the Nevada Test Site at more appropriate levels. In FY 1984, approximately $216,200,000 will be devoted to testing capabilities.

Special projects category includes activities that utilize many of the scientific and technical capabilities employed in the design and development of nuclear weapons. Major areas of emphasis include research and development efforts related to improved hardware, systems, and procedures for the protection of nuclear weapons and strategic quantities of special nuclear material during shipment and storage; the operational costs associated with maintenance of the Department of Energy's Nuclear Emergency Search Team capabilities located at Las Vegas, Nevada, and Andrews Air Force Base, Maryland, and research efforts directed toward the development of improved search and detection systems and techniques for incorporation into the Nuclear Emergency Search Team; and other special studies and audits. This category also contains the funding for 8 federal couriers at the San Francisco Operations Office, 54 federal employees at the Los Alamos Area Office, and 13 federal employees at the Sandia Area Office. In FY 1984, approximately $50,380,000 is planned for special projects.

Computer Leases

Large scientific computers are essential for the design of modern nuclear weapons. With the recent growth in the weapons program science and technology base, the weapon laboratories' computer facilities have been saturated. Although we are achieving improved quality and understanding of conventional weapon designs, design physicists will continue to be challenged by evolving military requirements and emerging technological opportunities that are impossible to achieve or realize without strong state-of-the-art computational capabilities. Continued growth in the weapons technology base will be heavily dependent upon a corresponding growth in our supporting computational capabilities and capacities.

Included in the operating request is approximately $23,935,000 for leasing major computer systems. The growth in FY 1984 lease costs relates primarily to the inclusion of Class VI/VII scientific computers at both Lawrence Livermore National Laboratory and Los Alamos National Laboratory. Class VII technology is needed to meet the increasing complexity of the calculational models used in the weapon design process. These models, employing elaborate two- and three-dimensional geometries, are necessary to improve the physics understanding of nuclear devices and to address evolving areas of physics associated with new concepts. The codes required to portray these models will require increased computational capabilities and capacities. At this point, the availability of the next generation of large scientific computers in FY 1984 is uncertain. Therefore, upgraded Class VI capability will be acquired if the Class VII technology is not available.

	FY 1983 Appropriation	FY 1984 Request
Lawrence Livermore National Laboratory		
Univac 1100/81 Storage Upgrade	$ 130	$ 0
CRAY-1 (3)	1,735	2,445
CRAY (4)	1,200 a/	3,200
CHORS II Network, Phase 1	120	80
Storage System Archival Memory, Phase 1	125	125
CRAY-1 (3) I/O System Upgrade	0	225
Class VI/VII	0	1,500
Administrative Computer Processor	0	200
Total	$ 3,310	$ 7,775

a/ Initially delivered configuration to be upgraded to final configuration in FY 1983 or early FY 1984.

	FY 1983 Appropriation	FY 1984 Request
Los Alamos National Laboratory		
CRAY-1 (2)	$ 390	$ 0
CRAY-1 (3)	3,400	3,400
CRAY (4)	2,430 a/	3,830
CRAY-1 (5)	1,520 b/	1,530
Mass Storage Upgrade, Phase 1	40	0
Electronic Swapping System	40	0
Administrative Computer	185	370
Class VI/VII	0	1,545
Total	$ 8,005	$ 10,675
Sandia National Laboratories		
CRAY-1 (1), SNLL	$ 1,900	$ 200
CRAY-1 (1), SNLA	2,400	1,000
Dual Front-End Engineering, SNLA	230	260
Laser Printer-Univac, SNLA	200	260
Data Reduction Replacement, SNLA	900	850
Timeshare System, SNLA	900 c/	1,200
Administrative DP Center, SNLA	0	15
IFS Expansion, SNLA	0	200
Timeshare System, SNLL	0	1,200
Super Mini Network, SNLA	0	200
Total	$ 6,530	$ 5,385
Nevada Operations Office		
Distributed Network	0	100
Total	$ 17,845	$ 23,935
CAPITAL EQUIPMENT	$ 93,000	$108,400
Research and Development	62,500	68,800
Testing	30,500	39,600

The weapons program capital equipment funding for research, development, and testing supports specific program needs at the Nevada Test Site and the national laboratories--Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories. In addition, a portion of these funds is used to support the administrative and site operations at these locations, including safeguards and security equipment, health and safety equipment, office equipment, and maintenance and warehousing equipment.

	FY 1983 Appropriation	FY 1984 Request
Lawrence Livermore National Laboratory		
Basic	$ 13,850	$ 15,050
Computers	2,850	7,850
Total	16,700	22,900
Los Alamos National Laboratory		
Basic	11,610	15,100
Computers	8,990	4,600
Total	20,600	19,700
Sandia National Laboratories		
Basic	20,300	20,700
Computers	5,400	8,900
Total	25,700	29,600
Nevada Operations Office		
Basic	30,000	33,700
Computers	0	2,500
Total	$ 30,000	$ 36,200

a/Initially delivered configuration to be upgraded to final configuration in FY 1983 or early FY 1984.

b/Costs of this system will be charged to programs on the basis of usage. The weapons program costs will represent approximately 15 percent of the total.

c/New FY 1983 item previously planned for FY 1984.

	FY 1983 Appropriation	FY 1984 Request
Total		
Basic	75,760	84,550
Computers	17,240	23,850
Total	$ 93,000	$108,400

The weapons research, development, and testing effort encompasses a highly complex set of activities. An adequate equipment base in the research, development, and testing complex is essential in maintaining this Nation's position in the forefront of nuclear weapons technology and as a protection against technological surprise. Despite the need to maintain an adequate equipment base, the historical investment pattern over the last 10 to 15 years has been one of significant underfunding. This has resulted in a deterioration problem in terms of physical condition and technological obsolescence of the capital equipment inventory. Efforts are now underway in the utilities and equipment restoration program to replace existing capital assets that are physically poor and technologically obsolete.

In conjunction with these initiatives, adequate basic capital equipment funding will be required to halt the occurrence of further deterioration. The requested level for basic capital equipment significantly slows the deterioration in the weapons testing complex capital equipment inventory which is judged to be the highest priority need in FY 1984 because of its potential near-term programmatic impacts.

	FY 1983	FY 1984
BASIC EQUIPMENT	$ 75,760	$ 84,550
Research and Development	45,260	47,450
Testing	30,500	37,100
Lawrence Livermore National Laboratory	$ 13,850	$ 15,050

Capital equipment requirements at the Lawrence Livermore National Laboratory included in this request constitute items devoted to weapons program needs as well as a portion of the general support equipment items necessary for operation of the laboratory. In addition, funds are included to provide safeguards and security equipment needed to harden facilities and to improve special nuclear material measurement.

Representative items in the FY 1984 budget for the Lawrence Livermore National Laboratory include a radiographic linear accelerator, excello-type precision turning lathe, scanning electron beam microscope, laser pattern generator, position high vacuum chamber, 400 kv x-ray machine, and a color scanner.

	FY 1983	FY 1984
Los Alamos National Laboratory	$ 11,610	$ 15,100

Capital equipment requirements at the Los Alamos National Laboratory included in this request constitute items devoted to weapons program needs as well as a portion of the general support items necessary for operation of the laboratory.

Representative items in the FY 1984 budget for the Los Alamos National Laboratory include a vacuum quench furnace, transient digitizers, thermal ion mass spectrometer, auger spectrometer, pumped dye laser, rotating mirror camera, 600 channel time interval systems, transient digitizer system, high speed streak camera, oscilloscope replacements, and a KrF pre-amplifier.

	FY 1983	FY 1984
Sandia National Laboratories	$ 20,300	$ 20,700

Capital equipment requirements at the Sandia National Laboratories located in Albuquerque, New Mexico, and Livermore, California, constitute items for weapons program needs and a portion of the general support equipment items necessary for operation of the laboratories.

Included in this request is $1,210,000 for a Mobile C band radar to be located at the Tonopah Test Range (TTR), Tonopah, Nevada.

The weapons systems test capability at the TTR relies heavily on the data received from a network of instrumentation radars to both control the test operation and to provide system evaluation data for post-test analysis. These radars also provide real-time information to establish a test vehicle acquisition vector for the TTR photo-optic system and to control camera focus during a test operation. The increased sophistication of weapons delivery techniques and resulting data requirements are severely taxing the capabilities of this radar network. Use of low-level, terrain avoidance and following techniques requires that the instrumentation radars be readily deployed in diverse locations around the test site to provide the real-time coverage for test operation control. Advances in technology also require that more sophisticated tracking methods be developed for system instrumentation. The development of high altitude maneuvering vehicles and the requirement to monitor vehicle motion with other than optical techniques requires that the TTR radars have coherent capabilities. The new radar will be constructed around a precision mobile antenna pedestal now at TTR, thus eliminating a major subsystem cost. It will include the capability to record relative phase information between the transmitted and return signal and will be deployed in a highly mobile configuration to support test operations off-range as well as on the TTR. Failure to acquire this tracker will limit the flexibility of the TTR instrumentation radar network and will severely restrict TTR's capability to respond to the measurement requirements of modern weapon systems.

Examples of other items in the FY 1984 budget request for the Sandia National Laboratories include a network analyzer, "S" and "L" based telemetry tracker, capacitor fabrication equipment, time-resolved Raman spectrograph, ultrafast streaking camera, data system for x-ray photoelectron spectrometer, and hyperchannel adapters.

	FY 1983	FY 1984
Nevada Operations Office	$ 30,000	$ 33,700

The FY 1984 equipment request for the Nevada Operations Office supports equipment requirements related to the execution of the underground test program at the Nevada Test Site and the Nuclear Emergency Search Team's capabilities.

Included in this request is $1,100,000 for a security helicopter at the Nevada Test Site.

The helicopter is needed to respond to alarms and provide close surveillance of the area around nuclear testing sites. It will be used to monitor areas adjacent to routes of nuclear convoys onsite, as well as providing escort for nuclear convoys. The helicopter would also be used as an observation platform for emergency situations to assist in assessing the emergency and coordinating the proper response.

Also included in this request is $4,000,000 for a Cable Downhole System (CDS) to be located at the Nevada Test Site.

The CDS is the hardware package designed to replace the current method of emplacing a nuclear test package and diagnostic assembly downhole at the NTS. The present method is a time-consuming and inefficient process but does place the assembly safely downhole without damage to the test package.

The CDS will allow for a much quicker emplacement of the device, thus reducing the operation from 10 days to approximately 2 days. This means a more productive utilization of both manpower and equipment resources, since they can be redirected to accomplish other work. This redirected effort will provide a cost saving, plus it will have the effect of levelling out the manpower requirements for the construction task. In addition, the reduced field time means a more efficient utilization of equipment, as it too can be used for other work. The system has a potential payback period of 2-1/2 years.

Other representative equipment items included in the FY 1984 budget request include: detection systems; Nuclear Emergency Search Team operational support equipment; Nevada Test Site construction equipment; Nevada Test Site communications equipment; laboratory office, security, and protection equipment; general shop, operational, and maintenance equipment; and improved data acquisition equipment.

	FY 1983 Appropriation	FY 1984 Request
Major computer equipment	$ 17,240	$ 23,850
Research and Development	17,240	21,350
Testing	0	2,500

The request provides funding for the conversion of prior-year leases for major computational equipment items. The FY 1984 request represents a significant increase over FY 1983 and has limited the basic equipment funding availability for the research, development, and testing complex. It should be noted that this is the most cost-effective approach for the overall program and provides the greatest long-term benefit to the program in that it reduces the near-term burden on the operating budget, thus providing resources for continued technology base growth while reducing the longer-term computer equipment buy-out mortgage on the capital equipment.

Research and Development

	FY 1983 Appropriation	FY 1984 Request
Lawrence Livermore National Laboratory		
UNIVAC 1100/81 Storage Upgrade	$ 850 a/	$ 0
CHORS II Network, Phase 1	2,000 a/	600 a/
Storage System Archival Memory, Phase 1	0	2,500 a/
CRAY-1 (3) I/O System Upgrade	0	3,000 a/
Administrative Mass Storage	0	450
Interactive Graphics Systems	0	1,300
Total	$ 2,850	$ 7,850
Los Alamos National Laboratory		
Mass Storage Upgrade, Phase 1	$ 290 a/	$ 0
CRAY-1 (2) Conversion	7,500 a/	0
Electronic Swapping System	1,200 b/	0
Mass Storage Upgrade, Phase 2	0	1,600
Input/Output Station	0	800
Interactive Graphics Systems	0	2,200
Total	$ 8,990	$ 4,600

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a/Capital funds required for conversion of prior fiscal year leases.

b/Previously approved FY 1982 item purchase price increased due to change in expected technology.

	FY 1983 Appropriation	FY 1984 Request
Sandia National Laboratories		
CRAY-1 (1) Network Conversion, SNLL	$ 4,300 a/	$ 0
Mass Storage/Front-End, SNLL	1,100	0
CRAY Conversion, SNLA	0	4,600 a/
CRAY Network/Storage Upgrade, SNLL	0	1,800
Interactive Graphics Systems	0	2,500
Total	$ 5,400	$ 8,900
Total Research and Development	$17,240	$21,350

Testing

	FY 1983 Appropriation	FY 1984 Request
Nevada Operations Office		
Distributed Network	$ 0	$ 2,500
Total Testing	$ 0	$ 2,500
Total Research, Development, and Testing	$17,240	$23,850

Following are brief descriptions of the major new computer items planned for purchase in FY 1984.

Lawrence Livermore National Laboratory (LLNL)

	FY 1983 Appropriation	FY 1984 Request
Administrative Mass Storage	$ 0	$ 450

This funding is for purchase of an archival mass storage system and additional terminals for the UNIVAC 1100/81 Administrative System. Initially, a minimum configuration was acquired with planned enhancements as the system moved into a full production workload. This increment will be acquired to provide storage capacity consistent with the workload requirement for such capacity.

	FY 1983 Appropriation	FY 1984 Request
Interactive Graphics Systems	$ 0	$ 1,300

Recent developments in computer-aided design/computer-aided manufacturing (CAD/CAM) technology have been successfully applied to nuclear weapon design, analysis, drafting, and manufacturing at Lawrence Livermore National Laboratory. Implementation of this technology has proven to be a cost-effective way to increase our productivity and capability in weapons development. Accordingly, we are accelerating our investment in interactive graphics capability. The principal goals for this effort are: (1) to provide enough equipment to allow us to originate all weapon designs on computer-aided design systems, and (2) to install an integrated documentation data base to control and communicate design information in digital form. Accomplishing these goals will allow us to communicate our design information to the rest of the nuclear weapons complex, further increasing benefits from our CAD/CAM investment at Lawrence Livermore National Laboratory.

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a/ Capital funds required for conversion of prior fiscal year leases.

Los Alamos National Laboratory (LANL)

	FY 1983 Appropriation	FY 1984 Request
Mass Storage Upgrade, Phase 2	$ 0	$ 1,600

To keep pace with the growth of computing capacity and capability, the Common File System (CFS) must be upgraded to maintain the required access speed and file storage capacity. For programmatic purposes, the CFS has demonstrated its effectiveness in keeping frequently accessed files available for quick access and to archive files not frequently used. The CFS successfully provides quick access, reliable storage, archival storage, security, and the opportunity for file sharing. The upgrade will add a controller to the CFS for a full complement of three controllers. Two will share the workload to respond to user requests, thereby improving response time and providing process capacity for the growth in demand. The third controller will be used to back up the two serving controllers and, when not needed for backup, will be used for software development and maintenance. The storage capacity of the disks and mass storage will be increased in response to the growing demand for storage and to maintain or improve the system's overall response to user demands.

	FY 1983 Appropriation	FY 1984 Request
Input/Output Station	$ 0	$ 800

Currently, each worker computer at LANL has its own card and tape peripheral station. Operations can be handled more efficiently and effectively if such peripheral equipment functions as card handling, tape handling, and floppy disk handling are centralized in one location. The most important benefit will accrue to users whose data formats will be essentially independent of the particular worker machines to be used. Systems programming will be simplified because only one set of device-support routines will have to be maintained rather than a set for each worker computer. Also, new data media devices can be added efficiently.

Equipment to be acquired includes a control processor like the IBM 4341; an identically configured backup processor; new technology tape drivers (as well as support for existing tape drives); card reader and punch equipment; and required operational support equipment such as console terminal, printer, and system storage devices.

	FY 1983 Appropriation	FY 1984 Request
Interactive Graphics Systems	$ 0	$ 2,200

These systems will allow the Los Alamos National Laboratory to integrate its weapons design and testing activities from design through prototype fabrication. They will also provide the capability to respond to the increased design and manufacturing requirements of the weapons development program with less increase in design and manufacturing staff and at a considerable cost saving to the overall program. The requested FY 1984 funding will provide for design stations, the connection of these design stations with the Integrated Computer Network, and hardware and software packages for use in training system users.

Sandia National Laboratories (SNL)

	FY 1983 Appropriation	FY 1984 Request
CRAY Network/Storage Upgrade, SNLL	$ 0	$ 1,800

This upgrade will provide for an expanded network to support the Cray and time-share systems, and provide for expansion of the mass storage system. The network upgrade will enhance the accessibility and effective use of the laboratory's large computer systems. The storage upgrade will provide both storage capacity and storage controller capability to support the increased mass storage requirements.

	FY 1983 Appropriation	FY 1984 Request
Interactive Graphics System, SNLA-SNLL	$ 0	$ 2,500

Integration and expansion of Computer-Aided Design, Drafting, Engineering and Manufacturing are the next steps in the use of CAD/CAM technology at Sandia National Laboratories. Sandia began using interactive computer-aided design in 1975 and, while present systems have demonstrated many benefits, further integration and increased capacity are necessary to realize the benefits in this rapidly changing technology. To realize these benefits, designs must be originated on computer-based systems and the data be available to those in the design, test, fabrication, inspection and acceptance phases of the weapons programs. Our FY 1984 acquisitions will increase our capacity for computer-aided design and add those peripherals and communication links necessary to make CAD/CAM a part of Sandia's network. This network will link designers, engineers, analysts, parts programmers, and others who need direct access to the design data base.

Nevada Operations Office

	FY 1983 Appropriation	FY 1984 Request
Distributed Network	$ 0	$ 2,500

The present equipment supporting the Nevada Operations Office and its contractors will have been in use for more than 13 years by FY 1984 and is incapable of providing satisfactory service to its interactive users. The proposed replacement system will consist of several minicomputers and associated peripherals sufficient to provide capability and capacity to meet the technical and administrative requirements of the Nevada Operations Office.

	FY 1983 Appropriation	FY 1984 Request
CONSTRUCTION	$42,000	$81,300
Research and Development	38,200	35,700
Testing	3,800	45,600

The following is a table listing the construction line items included in the FY 1984 request. Further details may be found in the individual construction project data sheets. The funding requested here includes the first installment in a major initiative designed to revitalize the testing complex of the weapons program. The history and justification of this requirement has been the subject of special studies and a continuing review within the Department of Energy. Execution of this program is considered to be essential to the long-term success of the weapons testing program.

Research and Development

Project Numbers	Title	TEC	FY 1983 Appropriation	FY 1984 Request
New Projects				
84-D-101	General plant projects, VL	$ 20,000	$ 0	$ 20,000
84-D-103	Hardened central guard force facility, LANL	6,600	0	600
84-D-104	Nuclear materials storage facility, LANL	20,000	0	700
	Total new projects		0	$ 21,300
Prior-Year Projects				
83-D-101	General plant projects, VL	$ 12,000	$ 12,000	$ 0
83-D-122	Los Alamos airport improvement, LANL	3,100	3,100	0
82-D-144	Simulation technology laboratory, SNLA	40,000	3,000 a/	8,000
82-D-150	Weapons materials research and development facility, LLNL	24,800	5,000 a/	2,900
82-D-152	New detonator facility, LANL	17,100	7,500 a/	0
82-D-153	Tritium facility, LANL	6,600	1,600	0
81-D-133	Earthquake damage restoration, LLNL	5,500	1,500	0
81-D-134	Earthquake damage restoration, SNLL	3,700	1,700	0
79-7-c	Proton storage ring, LANL	21,800	2,800	0
78-16-g	Radioactive liquid waste improvement, LANL	12,500	0	3,500 b/
	Total prior-year projects		38,200	14,400
	Total Research and Development		$ 38,200	$ 35,700

Testing

Project Numbers	Title	TEC	FY 1983 Appropriation	FY 1984 Request
New Projects				
84-D-101	General plant projects, VL	$ 7,100	$ 0	$ 7,100
84-D-107 c/	Nuclear testing facilities revitalization, VL	600,000	0	38,500
	Total new projects		0	45,600
Prior-Year Projects				
83-D-101	General plant projects, VL	$ 3,800	$ 3,800	$ 0
	Total prior-year projects		3,800	0
	Total Testing		$ 3,800	$ 45,600

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a/ Based on Further Continuing Appropriation Act, 1983 (Public Law 97-377), project cost estimates, funding requirements, and schedules may require adjustments.

b/ In FY 1981, $3,500,000 was deferred from funds appropriated in FY 1980; in FY 1982, this deferral was not restored.

c/ Project included in the FY 1984 budget to initiate the weapons testing facilities revitalization effort.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $27,100
Date: 1/83

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7. Financial schedule

		Costs			
Fiscal Year	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior to FY 1982	$ 0	$9,343	$1,614	$ 0	$ 0
1982	15,800	3,927	4,250	6,165	1,458
1983	15,800	0	3,200	5,500	7,100
1984	27,100	0	0	5,400	21,700

8. Brief physical description of project

This project provides for general plant improvements involving minor new construction. The work to be performed will include such activities as construction of roads, utilities, minor structures, capital alterations and additions, and technical facilities required for the operation of weapons program installations.

A project of this type cannot be detailed in advance. The subprojects listed below are examples of items under consideration. In general, the estimated funding for each location and listed subprojects is preliminary in nature and primarily indicative of the size of the subproject and the relative magnitude of the requirements. It should be noted also that the continuing study of requirements will result in changes in scope of some of the subprojects. Other subprojects will be added with the necessary postponement of some of those now included, depending upon conditions or situations not now apparent.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

8. Brief physical description of project (contd.)

This project covers requirements of the weapons research and development facilities (Los Alamos National Laboratory (LANL), the Lawrence Livermore National Laboratory (LLNL), and the Sandia National Laboratories (SNLA and SNLL)), and the nuclear weapons testing facilities (the Nevada Operations Office (NV) and its contractors).

9. Purpose, justification of need for, and scope of project

A general plant project is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction. Research developments and changes in technical program requirements frequently result in the need for altered or new construction items not previously anticipated. In the past, these changes have included building alterations or additions to house new equipment for research, development, and testing functions; construction of new small buildings; extensions or modifications to utilities; and general area development.

The weapons general plant project estimate for FY 1984 of $27,100,000 for research, development, and testing provides the level of effort essential to meet the existing programmatic requirements, requirements for maintenance and replacement due to the aging of the plant facilities and utilities, and other capital facilities.

The following subprojects are only examples of items of work which may be performed at the major locations covered under this project. These are grouped by location and under the following reason-of-need categories: Health, Fire, and Safety; Programmatic Needs; Pollution Abatement; Deteriorated Utilities; and Other.

The preliminary estimate of FY 1984 requirements by major area is as follows:

Weapons Research and Development	
Los Alamos National Laboratory	$ 6,300
Lawrence Livermore National Laboratory	7,400
Sandia National Laboratories	6,300
Nuclear Weapons Testing	
Nevada Operations Office	7,100
Total	$27,100

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

Los Alamos National Laboratory .... $ 6,300

(1) Health, Fire, and Safety

a. Waterline Cross-Connection Elimination .... $ 400

This project represents the FY 1984 portion of an ongoing program to separate potable and industrial water systems between laboratory sites and within buildings. Work consists of piping modification, installation of air-gapped storage tanks, and backflow preventer installations at locations having the highest priority for correction.

Subtotal - Health, Fire, and Safety ... [illegible]

(2) Programmatic Needs

a. Pinex Calibration Area .... $ 400

Work consists of constructing a 1,450-square-foot building addition to house a febetron, recording equipment, and long folded optical line-of-sight paths. This building addition is needed for the calibration of instrumentation for diagnostic testing used extensively in support of the augmented weapons test program at the Nevada Test Site (NTS).

b. Branch Shop Building .... $ 450

Work consists of erecting a new prefabricated metal building approximately 4,000 square feet and installing a 2-ton overhead crane for handling heavy stock and machined parts. The building is needed to accommodate new machine shop equipment and to increase total shop working area to support current weaponization and advanced development programs. There are increasing responsibilities for applications requiring large amounts of pulsed electrical power using explosive-driven devices. These efforts require large quantities of expendable but precision-made apparatus for experiments with high explosives. Fabrication in the fastest and most efficient manner is required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

c. Optional Multiplexing Addition .... $ 850

Work consists of constructing a 5,500-square-foot building addition. The building addition will provide the optical path necessary to demonstrate optical multiplexing. This is an ongoing program to provide a laser inertial confinement fusion driver for weapons physics studies, along with a laser amplifier in support of the multiplexing demonstration. The demonstration will determine the cost and feasibility of optically multiplexed energy extraction to increase laser efficiency and simplicity.

d. Plutonium Area Warehouse Facility Expansion .... $ 650

Work consists of constructing a 8,530-square-foot, 2-story warehouse building addition. Current storage at the plutonium facility is minimal. Increasing requirements have necessitated storage for the plutonium facility to be met at other sites. The new warehouse addition will free the present storage locations at the plutonium facility, as well as other sites, for a more practical and efficient use of laboratory space; thereby consolidating all storage at the plutonium site.

Subtotal - Programmatic Needs .... $ 2,350

(3) Pollution Abatement

a. Sewage Lagoon Improvements .... $ 350

Work consists of adding sand filters and other treatment components to a number of sewage lagoon systems throughout the laboratory. Effluents from several lagoon systems do not meet Environmental Protection Agency standards and additional treatment/filtration is required to bring the systems into compliance.

Subtotal - Pollution Abatement .... $ 350

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(4) Deteriorated Utilities

a. Replace Explosion-Proof Heaters - Weapons Areas .... $ 175

These explosion-proof heaters are a steam electric-type unit heater used in approximately 20 small explosive assembly buildings throughout the weapons areas. Due primarily to age, these heaters are developing casting pinholes which are very difficult or impossible to repair and still retain the integrity of U.L. approval for explosive services. Repair is costly and buildings cannot be used without temperature control.

b. Turbine Repair and Controls Replacement, Power Plant .... $ 850

The turbo generators at the main power plant provide critical backup power for the laboratory. Unit #1 turbine needs significant repairs and replacement of the blades and related parts due to normal wear, metal deterioration, and erosion from many hours of operation. The turbine instruments and controls are over 25 years old, with replacement parts being unavailable in most cases. New controls require much less maintenance, provide better results, and provide more accurate control of the turbines.

c. Replace Vacuum System, High-Explosives (HE) Buildings .... $ 325

These buildings house explosives handling and machining operations. The vacuum systems are piped with screwed fittings which is contrary to explosive safety regulations. The tanks and piping are HE-contaminated making repairs troublesome and expensive. Systems are old and in poor condition.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

d. Addition to Main Power Plant .... $ 750

This project would provide for the consolidation and centralization of utility personnel engaged in operation of the water, gas, electric, and sewage systems. The water laboratory would control the testing of water for the steam plants, water systems, and sewage treatment processes. The space is in great need as the operation is now scattered throughout the technical areas and in space that is considered not suitable for the use.

e. Plant Equipment Improvements .... $ 650

Work consists of replacing items of a building service equipment nature and service systems in weapons buildings throughout the laboratory. Included are equipment and systems associated with compressed air, heating, refrigeration, air-conditioning, chilled water, and electrical. Generally, these systems and equipment are obsolete, undersized, and/or extensively deteriorated due to overage (the average age of the physical plant at LANL is about 20 years) and operating conditions. The plant equipment and systems identified in this project have been slated for replacement because restoration to optimum operating conditions by expense-funded maintenance is either impossible or is greater than the replacement cost.

Subtotal - Deteriorated Utilities ..... $ 2,750

(5) Other

a. Laboratory Offices and Craft Shop .... $ 300

Work consists of construction or purchasing two 1,600-square-foot, transportable-type office buildings and purchasing one 1,500-square-foot prefabricated metal shop building, including installing all associated utilities. The three structures will provide a reporting station,

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CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

as well as all necessary tools and materials to support field maintenance, laboratory services, and construction activities in the vicinity of many outlying job sites. The field base operations will greatly increase productivity and efficiency by providing field personnel near work locations with tools and materials on hand; thereby allowing timely response to all emergencies, as well as normal activities. The field base operation offices and craft shop will also provide a close interaction between people and projects at these sites.

b. Minor Work Items (General Purpose) .... $ 150

Minor work items usually vary in cost from several hundred dollars to $85,000. Inasmuch as many of those small jobs are unknown or of an emergency nature involving capital repairs or additions to the plant, it is impractical at this time to make an itemized list of the sorts of work that would be accomplished using FY 1984 GPP funds. Typically, work covered under this general category includes correction of routinely identified health and safety defects; minor fire protection improvements, such as fire mains and hydrants and small alarm and sprinkler installations; fencing and other minor safeguard improvements; replacements or improvements to roads, parking areas, and utility systems; and modifications and improvements to other facilities.

Subtotal - Other .... $ 450

Lawrence Livermore National Laboratory .... $ 7,400

(1) Health, Fire, and Safety

a. Medical Decontamination Facility .... $ 125

The creation of a personnel decontamination facility in the Livermore site medical building requires room modifications to accommodate air locks, filtering systems, and retention tanks.

b. Bio-Assay Fume Hoods .... $ 150

Bio-assays are done in a variety of fume hoods normally used for programmatic requirements. This project consolidates the five required bio-assay fume hoods in one location.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

c. High-Explosive Chemistry Buildings, Central Exhaust System .... $ 200

Installation of a centralized exhaust system with an elevated stack will prevent exhausted fumes from reentering the building.

Subtotal - Health, Fire, and Safety ... $ 475

(2) Programmatic Needs

a. Welding Shop Expansion, Site 300 .... $ 550

Increased program activity associated with new facilities, accelerated research and development, environmental and hydrodynamic testing has increased staffing and workload on technician support shops beyond existing capabilities. This project will provide additional facilities required to meet program needs.

b. Metallurgical Chemistry Building, Instrument Air System .... $ 125

The plutonium metallurgical chemistry laboratory requires particularly sensitive and accurate instrumentation because of the materials in work and the experimental techniques employed. Enhanced instrument air is required for calibration and actual experimental running accuracies.

c. Electron-Positron Accelerator Building, Hi-bay Extension .... $ 175

An area is needed to assemble and test new accelerator components. Extending the hi-bay to cover an existing concrete slab will satisfy the space requirement.

d. Site 300 Covered Equipment Area .... $ 175

A large number of construction equipment items are stored exposed to the elements, causing rapid deterioration. Unreliability and high maintenance can be greatly reduced by constucting a covered parking area for this equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

e. Site 300 Road Upgrade .... $ 225

The general road conditions at Site 300 are worsening with age. A number of locations are in need of repair.

f. Plating Laboratory Addition .... $ 600

A 1,400-square-foot addition to the plating shop will provide space for a development laboratory and the consolidation of plating laboratory support equipment presently located in makeshift shelters.

g. Computations Building Renovation .... $ 350

Renovation of the computations building to satisfy computational requirements would require heating, ventalitating, and air-conditioning; lighting; floor covering; and OCTOPUS/WANG connections.

h. Site 300 Corporation Yard Building .... $ 100

A 2,400-square-foot staging building is required at Site 300 to protect the building crafts' materials from the elements and to provide maintenance and administrative control of minimum material inventories.

i. Hydrodynamics Diagnostics Bunker Upgrade, Site 300 .... $ 850

The increased hydrodynamics testing to support nuclear test activity enhancement and new weapon design concepts requires the addition of approximately 2,000 square feet to the existing building. This addition will provide housing and protection of new diagnostics equipment, workspace, and associated laboratory facilities.

Subtotal - Programmatic Needs .... $ 3,150

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(3) Deteriorated Utilities

a. Replace Chemistry Air Wash System .... $ 750

This system is technologically inadequate. It requires constant water treatment for bacteria, has high maintenance costs; repair parts require manufacturing; and it produces high humidity, restricting high-technology uses of the laboratories. The evaporator system will be replaced with refrigeration units.

b. Replace Heating and Cooling System in the Process Complex, Site 300 .... $ 600

The present system is a single, oil-fired, manned boiler that supplies steam to four major buildings. It has a high maintenance record and is costly to operate. It is increasingly difficult to maintain the boiler within safety requirements. Replacement will involve installation of four small, electric, unmanned boilers, providing each building with its own system.

c. Modify Low Conductivity Water Piping in Materials Fabrication Shops .... $ 600

This complex manufactures nuclear device components. The low conductivity water system in this complex is not performing at an adequate confidence level. The system is old and has been subjected to many changes and additions; however, it can be modified to adequately meet present and future demands.

Subtotal - Deteriorated Utilities ..... $ 1,950

(4) Other

a. Extend Main Sewer .... $ 250

Installation of 4,000 linear feet of 8-inch sewer line will provide gravity flow, eliminating the need for over 10 pumping stations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

b. Communication Ducts	$ 375		

Communication ducts are typically used for telephone, computer, and alarm lines. Old ducts are filled to capacity and are deteriorating with age. This problem, combined with new requirements, requires the construction of new ducts and manholes.

c. Safeguards and Security Hardening of Special Nuclear Facilities, Site 300	$ 500		

Harden the linac radiographic facility, vibration and shock dynamic test cells, and police and fire department communication center. These facilities will either be hardened or provided with an active denial system to provide a delay factor for unauthorized removal of special nuclear material.

d. Expand Communication Center	$ 700		

The security communications center will be expanded to accommodate increased alarm, closed-circuit television, and communications systems.

Subtotal - Other		$ 1,825	
Sandia National Laboratories			$6,300

(1) Health, Fire, and Safety

a. Addition to Medical Facility, SNLA	$ 400		

There is a severe lack of space in the medical facility to meet the needs of current programs. Additional space will be used for physical examination/treatment rooms, a decontamination room, alcoholism and psychological testing, and a general purpose room for various medical training programs and the blood donor program.

Subtotal - Health, Fire, and Safety		$ 400	

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(2) Programmatic Needs

a. Addition to Engineering Building, SNLA	$ 500

This 1,600-square-foot addition to the engineering building will provide necessary computer floored space to house the computer network central, development system, network fiber optic communications, interactive graphics system, FM magnetic tape A/D reduction center, and a portion of the engineering data analysis center in support of all Coyote Canyon Test Complex facilities. Location of these systems in the engineering building addition will provide transparent access to all facility systems on fiber optic communications lines and thereby optimize the data analysis and test item modeling necessary to close the loop from experimental results back to the theoretical model.

b. Instrumentation Calibration Laboratory, SNLA	$ 810

The increasing demands on inertial instrumentation make it mandatory to be isolated from surrounding vehicular traffic and electrical line interference. Gyro acceptance also requires the isolation. Approximately 6,000 square feet of special foundation and power line isolation will allow adequate inertial calibration capability.

c. Building for Uncleared Drafters, SNLA	$ 700

Approximately 7,000 square feet of space, adjacent to Tech Area I, to house contract drafting, drafting trainees, and uncleared new hires. Contract drafting is temporarily housed in space loaned by the Air Force located approximately three-quarters of a mile from the center of the main tech area. The proposed space would permit efficiencies and dollar savings to be realized through shortened communciation lines to project engineers and supervisors, and more effective direction and training of uncleared new hires. Savings would also result from eliminating periodic relocations of contract drafters from one temporary location to another at the discretion of the military.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations
2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

d. Expansion of Gun Facility, SNLA .... $ 250

The existing building houses both the powder gun and light gas gun, although it was originally sized to house only one gun. As a consequence, clearances around both guns are very small, being only 2 feet between the light gas gun and the wall and between the two guns. One side of the light gas gun impact chamber is against the wall and inaccessible. Both sides of the powder gun impact chamber have very tight clearances. Visar and holography setups usually cause complete blockage of access from one end of the building to the other, and many instrumentation setups which are desirable cannot be accommodated because of space limitations. This project will extend one side of the building to alleviate this situation.

e. Materials/Physical Research Laboratories, SNLL .... $ 600

All existing laboratory space at SNLL is fully used. Additional laboratories are needed for materials research and physical research. The warehouse area vacated by general stores will be converted into the needed laboratories.

f. Commercial Power to Coyote Test Field, SNLA .... $ 400

Commercial power will be extended to the cable site in Coyote Test Field. The site is presently served by motor generators. Commercial power will effect savings of fossil fuel and provide more dependable power sources.

Subtotal - Programmatic Needs .... $ 3,260

(3) Deteriorated Utilities

a. Steam Manholes Equipment Relocation .... $ 150

Seven existing underground steam vaults or manholes are arranged with appreciable equipment, such as coverters, pumps, and electrical controls, all of which have deteriorated from excessive temperatures and frequent flooding. This project relocates this equipment to equipment rooms in adjacent buildings.

b. Underground District Steam System .... $ 400

Most of the plant district steam system is in excess of 30-years-old and the condensate piping is severely corroded. This project is a continuation of a programmed replacement of the parts that are poor in the system.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

b. Underground District Steam System .... $ 400

Most of the plant district steam system is in excess of 30-years-old and the condensate piping is severely corroded. This project is a continuation of a programmed replacement of the parts that are poor in the system.

c. Central Steam Plant-Condensate/Feedwater System .... $ 175

Most of the condensate piping in this plant is over 30-years-old and has corroded to the point that it is extremely difficult to maintain. Because of the buildup of plant loading over the years, much of this piping is also too small. This project replaces both the boiler feedwater piping and the blowdown piping.

d. Machine Shop, Main Chiller .... $ 275

The main chilled water source for space cooling of this building is a steam turbine-driven, 350-ton centrifugal compressor. It is over 30-years-old and replacement parts are no longer available. The manufacturer does not predict any further useful life for the machine. This project is to replace this water chiller with a more energy-efficient, electrical-driven compressor.

e. Central Steam Plant - Control and Burner Restoration for Boiler #5 .... $ 150

The burner for Boiler #5 is in poor condition such that it is extremely difficult to keep the boiler on line. This project is to replace the burner and its associated flame safeguard controls.

f. Weapons Office Light Laboratory Building, Replace Cooling Tower .... $ 100

The cooling tower for the chilled water system in this building is over 20-years-old. The main components of the tower are wood and they have deteriorated beyond their useful life. This project is to replace the tower with a more modern, long-life design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

g. Replace 2,400 Volt Underground Distribution Feeder .... $ 100

This underground primary feeder is 20-years-old and the last "High Potential Maintenance Test" indiated that it is near failure. This project will replace the feeder in kind.

h. Weapons Laboratory/Shop Facilities .... $ 200

These facilities are over 30-years-old and the air drawout circuit breakers in the load center substations are beyond their useful life and there is doubt about their ability to protect the distribution circuits in the systems. This project will replace these circuit breakers with new air drawout circuit breakers with electric operators.

Subtotal - Deteriorated Utilities ..... $ 1,550

(4) Other

a. Utility Improvements, SNLL .... $ 400

The existing 4.16 kV underground distribution line serving the west portion of the site is fully loaded. This project will complete the 13.8 kV distribution loop by extending a 13.8 kV undergound line from the main substation to the west portion of the site and connecting to the existing 13.8 kV line. Completion of this loop will improve reliability of the electrical distribution system and allow for electrical load growth in the west portion of the site.

b. Shipping and Receiving Warehouse, SNLL .... $ 500

This project provides an 8,600-square-foot warehouse and office building to house shipping, receiving, and material management offices. This will be the final removal of warehouse functions from weapons laboratory building 916 and will enable conversion of the remainder of 916 into laboratories to be funded in FY 1985.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

c. Minor Work Items .... $ 190

Requirements for small construction projects of less than $85,000 will be completed under this category. Typically, these projects will include minor health and safety improvements, fire protection, fencing, minor safeguards improvements, parking area changes, utility system extensions, etc.

Subtotal - Other .... $ 1,090

Nevada Operations Office .... $ 7,100

(1) Health, Fire, and Safety

a. Fire Training Facility, Mercury .... $ 200

A multistory concrete structure with apertures to emulate windows and doors and a graded isolation area will be constructed and utilized for training of all emergency response personnel. Currently, there is no training facility available, which makes the proper maintenance of skills difficult.

b. Modifications to Gate 100, Mercury .... $ 120

This project will provide three inbound traffic lanes separated by concrete traffic islands. In addition, concrete traffic islands on the existing three outbound traffic islands will be constructed. These modifications will provide for better traffic control and safety. In addition, guards must currently stand on the lane stripe to control access and egress on and off the NTS. This practice is a potential safety hazard.

Subtotal - Health, Fire, and Safety ... $ 320

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(2) Programmatic Needs

a. Sandia Photometrics and Data Processing Facility .... $ 450

A new 2,600-square-foot preengineered metal building will be constructed and will include darkrooms, restrooms, storage, equipment repair, processing, and office space. The facility will be electrically heated and air-conditioned and will have chilled water for photographic processing. Currently, these functions are housed in a small portion of an existing warehouse-type structure. As a result, the area is overcrowded and the mechanical systems are inadequate. The new facility will help reduce the waiting period for processed data; thereby expediting postevent analysis and evaluation.

b. Sheet Metal Shop and Office Building .... $ 350

This project provides a new 2,400-square-foot preengineered metal building to include shop, office, and storage space. The building will be constructed as an addition to the existing metal fabrication shop. The existing shop is currently overcrowded and programmatic increases in test activities are compounding this problem. As this condition worsens, it is probable that late delivery of shop-fabricated components may cause program slippages.

c. Radiological Safety Facility .... $ 120

A new 500-square-foot metal building will be constructed and will include offices, change room, restroom, and storage. Currently, this function is housed in an aged and deteriorated trailer which requires excessive maintenance. Increasing programmatic activity requires the proposed new facility.

d. Event Support Building .... $ 300

This project provides a new 2,000-square-foot preengineered metal building to include an office, restrooms, lounge, and dormitory space. Currently a cadre of event support crafts are located in an aged and deteriorated trailer complex at the control point. The condition of these trailers continues to deteriorate and will not support an increased program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

e.	Respirator Facility	$ 450

A new 2,400-square-foot preengineered metal building will be constructed and include a large shop area for servicing and storing respiratory protective equipment, a small office for records maintenance, and a toilet facility. Currently, this operation is housed in a common facility with another function; both operations are currently congested and overcrowded. The new facility would allow for the growth in both operations that is now being experienced due to increasing programmatic activities.

f.	Radiological Equipment and Supplies Storage	$ 150

This project provides for a new 1,500-square-foot preengineered metal storage building. Radiological equipment and supplies are currently stored in miscellaneous temporary wooden structures and trailers which are dispersed throughout the area. This project will consolidate storage in one structure; thereby improving property control and responsiveness.

Subtotal - Programmatic Needs .... $ 1,820

(3) Other

a.	Special Response Team Facility	$ 250

A new 3,500-square-foot, 2-story masonry block building will be constructed and will include an armored vehicle parking garage on the ground level and personnel and training space on the second floor. Currently, the special response team is housed in an aged and deteriorated trailer which is not large enough to conduct training.

b.	Safeguards and Security Helicopter Support Facility	$ 150

This project provides for a 1,800-square-foot preengineered metal building with a 35-foot-wide sliding door to accommodate a new safeguards and security helicopter. In addition, this building will include personnel facilities for the security response team. Due to the size and terrain of the NTS and the need for improved security response teams, a safeguards and security helicopter is planned for acquisition in FY 1984. This facility is needed to support that helicopter.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

c. Safeguards and Security Improvements .... $ 400

This project provides for initiating safeguards and security improvements at the NTS in the areas of: (1) duress alarm system and voice privacy equipment for NTS protective forces; (2) hardened temporary and stationary guardposts; (3) strategic sensor system; and (4) modifications to the entry point for NTS.

d. Drum Storage Dock Modification .... $ 220

A new 20-foot by 47-foot drum storage dock, complete with canopy, abrasive steel grating, and cantilevered 1-ton monorail, will be constructed. The existing dock is inadequate for the current program and the problem will be compounded as programmatic activities continue to increase.

e. Addition to Sandia Office Building .... $ 100

This project provides for an 800-square-foot masonry block addition to provide a conference room, vault room, restrooms, and change rooms. This addition is required to accommodate increases in personnel related to programmatic increases.

f. Fleet Operations Maintenance Facility .... $ 670

A new 4,800-square-foot preengineered metal building will be constructed and will include light- and heavy-duty repair bays, lubrication and alignment pit, tire repair bay, storage, office, and restrooms. This facility will provide for maintenance of approximately 30 percent of the NTS vehicles, those which are primarily located in adjacent areas. Currently, this group of vehicles must be taken either 20 miles north or 20 miles south for maintenance.

g. NTS General Construction Materials Storage .... $ 700

A new 7,200-square-foot preengineered metal warehouse building to include a 12-foot-wide by 16-foot-high electric rollup door will be constructed. This facility will provide for storage of special order materials prior to their incorporation in various construction

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

projects. Currently, this storage is either in old temporary wooden structures or is stored on tarpaulin-covered pallets. This system makes retrieval cumbersome and inefficient.

h.	Addition to Heavy Equipment Repair Facility Warehouse	$ 700

This project provides for a 7,000-square-foot, rigid frame, metal addition to include offices, restrooms, flammable storage, and parts storage. Receipt and storage of heavy equipment repair parts occupies one bay of the shop. With the ongoing increases in programmatic activities, this bay is required for repair work. In addition, the amount of spare parts storage will also increase.

i.	Addition to the Welding Operations Support Facility	$ 120

A new 760-square-foot addition to the compatible construction with the existing preengineered metal building will be constructed. The present facility is now operating at capacity; frequently, it is necessary to delay recertification of welders because of certification of new hires. This condition will continue to worsen as test activities increase.

j.	Cafeteria Expansion	$ 450

A 2,700-square-foot addition to the existing cafeteria facility will be constructed, including a 400-square-foot walk-in refrigeration box. This addition will allow service for an additional 150 people per meal to accommodate personnel increases being experienced to meet increased programmatic requirements.

k.	Heavy Equipment Dispatch Building	$ 250

This project provides for a new 1,800-square-foot preengineered metal building to include offices, dispatch area, and restrooms. This operation is currently housed in an aged and deteriorated trailer which is too small for the increases in programmatic activity.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations
2. Project No.: 84-D-101

9. Purpose, justification of need for, and scope of project (contd.)

l. Covered Storage .... $ 410

A new 6,000-square-foot warehouse-type building for storage of perishable and salvaged materials and equipment will be constructed. This storage is currently either in existing inactive tunnels or adjacent structures. The high humidity of the tunnels causes rapid deterioration. In addition, material control is difficult with this scatter storage.

m. Minor Work Items .... $ 540

Requirements for small construction projects under $85,000 will be completed under this category. Typically, these projects will include minor health and safety corrections, fire protection, fencing, minor safeguards improvements, parking area changes, utility system extensions, etc.

Subtotal - Other .... $ 4,960

10. Details of cost estimate

a. Engineering, design, and inspection	$27,100
b. Land and land rights	
c. Construction costs	
d. Contingencies	
Total estimated cost	$27,100

11. Method of performance

To the extent feasible, design and inspection will be performed under negotiated lump-sum architect-engineer contracts. To the extent feasible, constructon and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. In some instances, it will be more economical or timely for design, inspection, procurement, or construction to be done by operating constractors and others already under contract to the Government.

12. Pending schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not Applicable.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Hardened central guard force facility, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 84-D-103

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1985

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $6,600
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 600	$ 600	$ 600	$ 180
1985	6,000	6,000	6,000	3,200
1986	0	0	0	3,220

8. Brief physical description of project

The hardened central guard force building will be a partially buried structure of approximately 13,000 square feet housing a hardened facility environment with the capability of withstanding a light weapons fire attack while maintaining the communications, armory, and vault support functions necessary to coordinate other security resources as needed. The functions to be housed will be: a three-vehicle garage and maintenance room; a mechanical equipment room; an emergency electrical room; a radiological support space; an armory with a vault; a communication and dispatch room; a computer room; a ready room with kitchen and storage; a briefing room; offices; a men's change room, showers, and restroom for 200 men; a women's change room, showers, and restroom for 30 women; and a physical conditioning room.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Hardened central guard force facility, Los Alamos National Laboratory, Los Alamos, New Mexico	2. Project No.: 84-D-103

8. Brief physical description of project (contd.)

Land improvements and other structures will include improvements to a nearby road intersection, a paved access road, hardened guard station, paved parking for approximately 130 private vehicles outside the fence, and 40 official vehicles inside the fence, curb and gutter, and sidewalks. Southwestern-style landscaping will be provided to replace vegetation destroyed during construction.

The FY 1984 funding requested provides for Title I and II design of these facilities.

9. Purpose, justification of need for, and scope of project

The current political environment of ever-growing terrorist activities and the increasing threat of diversion of special nuclear materials (SNM), classified material, and other information for political, terrorist, or blackmail reasons make improved security protection essential for nuclear devices, components, weapons assemblies, classified information, significant quantities of SNM, other radioactive material, and physical plant security.

The laboratory has geographical features that are unique as compared to other comparable installations. The overall site contains more than 43 square miles of land area with over 150 miles of improved roads. In addition, the geography is composed of canyons ranging several hundred feet in depth, with parallel plateaus and rugged terrain. The elevations of the site range from 6,000 feet to over 7,300 feet mean sea level.

One of the chief objectives in the protection of the facilities within the laboratory is to continue improving the ability to coordinate an action within a minimum of time to respond to any unauthorized intrusion, for whatever purpose. The requested facilities purpose would be to contain critical security functions in a hardened environment. This facility is needed to: reduce the response time to the majority of the sensitive facilities; and enhance the ability to protect the laboratory, its communications systems, and other vital functions.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Hardened central guard force facility, Los Alamos National Laboratory, Los Alamos, New Mexico	2. Project No.: 84-D-103

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at about 15% of construction costs		$ 720
b. Construction costs		4,915
(1) Improvements to land	$ 890	
(2) Building - central guard force facility 13,000 square feet at about $217 per square foot	2,825	
(3) Other structures - hardened guard station	170	
(4) Utilities	630	
(5) Special facilities, including security detection and alarm systems	400	
c. Standard equipment		100
Subtotal		5,735
d. Contingencies at approximately 15% of above costs		865
Total estimated cost		$6,600

11. Method of performance

Design and inspection of the facility will be accomplished by negotiated architect-engineer contract. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 180	$ 3,200	$ 3,220	$ 6,600
Total facility costs	0	180	3,200	3,220	6,600
2. Other project funding					
(a) Conceptual design	55	0	0	0	55
Total other project funding	55	0	0	0	55
Total project funding (items 1 and 2)	$ 55	$ 180	$ 3,200	$ 3,220	$ 6,655

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hardened central guard force facility,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 84-D-103

12. Pending schedule of project funding and other related funding requirements (contd.)

b. Other related funding requirements (estimated life of project: 50 years)

1. Facility operating costs	$ 134
2. Programmatic operating expenses directly related to these facilities	630
3. Capital equipment not related to construction but related to the programmatic effort in the facility	1,400
Total other related funding requirements	$ 2,164

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

2. Other related project costs

(a) Conceptual design costs - costs included in this category are those necessary to develop a budget quality cost estimate and construction schedule.

b. Other related funding requirements

The estimated life of the facilities provided by this project is 50 years.

1. Facility operating costs

This category includes maintenance, janitorial, and utilities from FY 1981 costs calculated on a per-square-foot basis throughout the Los Alamos National Laboratory and projected to FY 1985. An 11 percent escalation per year was used on maintenance and janitorial base costs and 15 percent per year was used on utility base costs.

2. Programmatic operating costs

This cost figure was obtained as a product of 12 full-time equivalents (FTE's) scheduled for FY 1985 operating in this facility and the loaded cost per FTE (salary, overhead, material, and supplies) projected to FY 1985, using an escalation of 15 percent per year. The protective force or security personnel are assigned to outlying sites and not included in the direct operating expenses of this facility. All other operating equipment is existing and will be relocated to the new facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hardened central guard force facility,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 84-D-103

13. Narrative explanation of total project funding and other related funding requirements (contd.)

3. Capital equipment not related to construction

The amount shown is based on past operating history and anticipated requirements for new capital equipment for this program.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Nuclear materials storage facility, LANL, Los Alamos, New Mexico

2. Project No.: 84-D-104

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $20,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 700	$ 700	$ 700	$ 200
1985	19,300	19,300	19,300	6,100
1986	0	0	0	7,900
1987	0	0	0	5,800

8. Brief physical description of project

This project provides for the construction of a repository for long and intermediate storage of large quantities of source and special nuclear materials. It will be designed to meet security, safety, and safeguards requirements for the storage and handling of nuclear materials. The new 29,100-square-foot building will contain a vault area of approximately 13,000 square feet. In addition to the nuclear materials storage vault, the facility support area will contain a secure shipping/receiving area, safe/secure transport (SST) vehicle garage and dock, equipment space, offices, toilet/change rooms, general "cold" storage area, a date distribution room, a freight elevator, a transfer tunnel to connect the new facility with the existing facility, and other special features required of a facility used for storing and handling large quantities of nuclear materials.

Natural gas-fired hot water boilers for space heating will be provided, and summer temperature control will be provided for the storage vault area, shipping/receiving, and computer equipment by mechanical refrigeration. Mechanical ventilation will be provided for the general storage, SST garage, offices, toilet/change rooms, and equipment room. In addition to normal electrical service, an emergency bus will supply the ventilation system and an uninterruptable power supply for alarms and emergency lighting systems. The building will be equipped with a telephone system, a protected wireline system, a radiation

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear materials storage facility, LANL,
Los Alamos, New Mexico

2. Project No.: 84-D-104

8. Brief physical description of project (contd.)

monitoring system, and an intrusion detection system. Fire protection will be provided by a hydraulically designed wet pipe sprinkler system in the support areas and an independent automatic preaction sprinkler system in the storage vault area. The vault area preaction system will be actuated by an early warning detection system.

Special shielding will be built into the cells in the vault to minimize radiation exposure to employees working at the facility. The facility will be connected to the existing plutonium (Pu) processing building just north of the proposed site by an 8-foot-wide tunnel. The tunnel will be used for transferring nuclear materials between the new facility and the Pu processing facility. There will be vault doors at each end of the tunnel to ensure that physical protection requirements are met. The facility will also have an exhausted enclosure located in the shipping/receiving area for opening shipping containers received from offsite in order to minimize potential contamination associated with the unpacking of nuclear material shipments. Exhaust from this enclosure and the storage vault area will be discharged via absolute filtration and a stack.

To provide for physical security and to minimize public exposure to the special nuclear materials (SNM) park, a portion of an existing road must be rerouted. Included is approximately one mile of a two-lane arterial paved highway including transitions, connections, and intersection relocations. Site work will include parking for about six government vehicles, curbs and service road, landscaping, drainage, and erosion control.

The FY 1984 funding requested provides for Title I design of these facilities.

9. Purpose, justification of need for, and scope of project

The facility will provide needed secured and safeguarded storage and transfer facilities for SNM entering and leaving the laboratory. This facility is needed to accommodate the increasing recovery and storage demands being placed on the LANL by the agency. The Pu storage vault in the Pu processing facility at LANL is now filled to capacity. This storage vault was designed only as a medium capacity working inventory vault. Currently, the Pu storage vault is congested with long-term nuclear materials storage and nuclear material encased in shipping containers. The proposed storage facility will have enough storage space to accommodate the decommissioning of many of these inadequate storage facilities and will effect significant safeguards and security improvements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear materials storage facility, LANL, Los Alamos, New Mexico
2. Project No.: 84-D-104

9. Purpose, justification of need for, and scope of project (contd.)

The garage area for two SSTs will permit the transhipment of SNM for the agency, a function currently performed in an uncovered area. The purpose of the covered area is for weather protection and to shield the activity from outside view of uncleared persons. A special heating, ventilating, and air-conditioning system will be required so that specified air pressure levels throughout the facility can be maintained to prevent the spread of contamination in case of an accidental spill or release of material within the facility. The ventilation system will require absolute filters on the exhaust air to prevent the release of hazardous material to the outside environment in case of accidental spills or releases.

Current laboratory storage for enriched uranium and other nuclear materials is also at or near the maximum usage. To maintain combination storage for these materials, the laboratory has had to store its nuclear materials at widely separated locations. This facility will provide for consolidating LANL's SNM storage facilities.

10. Details of cost estimate a/	Item cost	Total cost
a. Engineering, design, and inspection at about 15% of construction costs, item b		$ 2,250
b. Construction costs		14,980
(1) Improvements to land, including grading, excavations, landscaping, paving, roads, and fencing	$ 2,480	
(2) Buildings		
(a) Nuclear materials storage area and shipping/receiving, approximately 15,600 square feet at approximately $491 per square foot	7,660	
(b) Support area, including truck garage, offices, toilet/change rooms, general storage, and equipment room, approximately 13,500 square feet at approximately $94 per square foot	1,270	
(c) Material transfer tunnel, approximately 4,000 square feet at approximately $105 per square foot	420	
(3) Utilities, including electrical power, fire protection and domestic water, natural gas, sanitary sewer, and communciations lines	3,150	
c. Standard equipment		100
Subtotal		17,330
d. Contingency at approximately 15% of above costs		2,670
Total estimated cost		$20,000

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear materials storage facility, LANL, Los Alamos, New Mexico — 2. Project No.: 84-D-104

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 200	$ 6,100	$ 7,900	$ 5,800	$ 20,000
Total facility costs	0	200	6,100	7,900	5,800	20,000
2. Other project funding						
(a) Conceptual design costs	180	0	0	0	0	180
Total other project funding	180	0	0	0	0	180
Total project funding (item 1 and item 2) ..	$ 180	$ 200	$ 6,100	$ 7,900	$ 5,800	$ 20,180 a/

b. Other related funding requirements (estimated life of project: 25 years)	
1. Facility operating costs	$ 550
2. Programmatic operating expenses directly related to the facility	880
Total other related costs	$ 1,430

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   2. Other project funding
      (a) Conceptual design

The amount shown is for conceptual design.

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a/ This total includes $180,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear materials storage facility, LANL,
Los Alamos, New Mexico

2. Project No.: 84-D-104

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

1. Facility operating costs

The annual facility operating costs are estimated for FY 1987 as follows: 29,100 square feet at $19.04 per square foot (based on the laboratory average of $1.41 for janitorial, $1.69 for maintenance services, and $3.60 for utilities in FY 1981 escalated 15%, 15%, and 22% per annum, respectively).

2. Programmatic operating expenses directly related to the facility

The annual cost of programmatic activities to be conducted in this facility is estimated at $880,000 for the year FY 1987. This cost figure was calculated for six FTE's as follows: FY 1981 loaded costs (salary, overhead, material, and supplies) for two FTE's at $55,000 per year and five FTE's at $50,000 per year projected to FY 1987 using an escalation rate of 16% per annum.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

3. Date A-E work initiated: 4th Qtr. FY 1982

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $40,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 1,200	$ 1,200	$ 1,200	$ 33
1983	3,000 a/	3,000 a/	3,000	1,380
1984	8,000	8,000	8,000	3,960
1985	17,000	17,000	17,000	9,200
1986	10,800	10,800	10,800	14,600
1987	0	0	0	10,827

8. Brief physical description of project

This project provides for the construction of one accelerator, Hermes III; the modification of an existing accelerator, Particle Beam Fusion Accelerator-I (PBFA-I); the necessary laboratory space for housing the Hermes III accelerator and other existing accelerators to be moved to the Simulation Technology Laboratory (STL); a control room; and the supporting diagnostics and data acquisition systems. Also included is laboratory space for experiments associated with utilization of the accelerators. The laboratory building consists of approximately 58,400 square feet--24,000 square feet of high bay, 13,400 square feet of low bay, and 21,000 square feet located below grade. Site work will consist of paved streets and parking

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a/ Based on Continuing Resolution, Public Law 97-377. Project cost estimates, funding requirements, and schedules may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

8. Brief physical description of project (contd.)

within the complex. Utilities, including water, sewer, underground power, and natural gas, will be extended from existing nearby utility systems.

The building will be constructed of prestressed, precast concrete wall and roof panels with integral wall insulation. Portions of the building below grade will be cast-in-place concrete. Special systems for storage, transfer, and processing of deionized water and transformer oil will be provided.

Hermes III will be an advanced gamma-ray simulator which will run at higher voltages, higher currents, and shorter pulses than the existing Hermes II accelerator. A factor of 10 in increased performance, coupled with increased exposure area, will allow testing of subsystems and systems which cannot be tested at Hermes II. The modified PBFA-I accelerator will be an advanced x-ray simulator which will provide higher fluences for larger area exposures and improved spectrum compared to existing x-ray sources such as Rehyd, Hydra, and Proto II. The modified PBFA-I will allow x-ray testing that is currently needed, but not now possible.

The FY 1984 funding will be used for continuing construction of the laboratory building.

9. Purpose, justification of need for, and scope of project

In order to develop simulation testing capabilities and apply them to the conduct of weapon effects tests on a timely basis, facilities dedicated to such uses are required. The simulation sources to be associated with the STL will be major improvements over the gamma-ray and x-ray laboratory sources that are presently available. They will, in many instances, have capabilities which match or are superior to the capabilities of underground testing. For example, the new radiation sources in STL will possess a better match to vulnerability requirements of dose, dose rate, pulse width, and spectral character than is presently available. Exposure areas available for testing will satisfy most agency requirements. In addition to weapons effects testing, the simulation sources will be available for use in future weapon system development and stockpile evaluation programs. Justification for the STL rests on the fact that future United States nuclear weapon systems such as the M-X and TRIDENT II will require new laboratory radiation facilities for vulnerability, hardening, and survivability testing.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

9. Purpose, justification of need for, and scope of project (contd.)

A dedicated simulation facility with vastly improved capabilities is possible because of recent advances in Sandia's Pulsed Power Program and increased understanding of electron beam transport physics. The STL would contain Hermes III, an advanced gamma-ray simulator. Hermes III is projected to be capable of delivering up to 0.6 million joules of e-beam energy in a single pulse to a bremsstrahlung converter target. A modified PBFA-I will be capable of delivering up to 0.5 million joules of energy to x-ray producing targets in a single pulse.

If STL were not constructed, essential radiation effects testing activities associated with development and hardness assurance of future weapon systems would be impacted. Existing sources such as Hermes II would have to continue to be utilized for testing. This source is more than ten years old, is experiencing serious operational problems because of age, and should be replaced. While the existing simulation sources have made significant contributions to the development of many United States weapon systems, they have not adequately matched important threat environmental characteristics that generate dose-rate-dependent radiation effects. The new advances in pulse power technology will make it possible to substantially improve this match and to achieve higher exposure levels over larger areas that will be required for testing of future systems.

10. Details of cost estimate a/	Item cost	Total cost
a. Engineering, design, and inspection at approximately 25% of construction costs		$ 7,000
b. Construction costs		28,000
(1) Improvements to land, including grading, paving, and fencing	$ 200	
(2) Building, approximately 58,400 square feet at about $154 per square foot	9,000	
(3) Special facilities, Hermes III and modifications to PBFA-I	16,800	
(4) Utilities, including mechanical utilities, sanitary and storm sewers, and electrical power .	2,000	
Subtotal		$35,000
c. Contingency at approximately 14% of above costs		5,000
Total estimated cost		$40,000

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico
2. Project No.: 82-D-144

11. Method of performance

Design and inspection of the building will be on the basis of a negotiated fixed-fee contract. Construction will be by fixed-price contract awarded on the basis of competitive bids. Sandia National Laboratories will design, procure, and install the accelerator and instrumentation components.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 1,413	$ 3,960	$ 9,200	$14,600	$10,827	$40,000
Total facility costs	1,413	3,960	9,200	14,600	10,827	40,000
2. Other project funding						
(a) Conceptual design	30	0	0	0	0	30
(b) Other project related funding .	7,550	2,000	1,700	1,300	800	13,350
Total other project funding .	7,580	2,000	1,700	1,300	800	13,380
Total project funding (item 1 & item 2)	$ 8,993	$ 5,960	$10,900	$15,900	$11,627	$53,380

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 340
2. Programmatic operating expenses directly related to the facility	6,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	500
4. GPP or other construction related to programmatic effort in the facility	450
Total other related funding requirements	$ 7,290

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory,
Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   2. Other project funding
      (a) Conceptual design was prepared by an architect-engineering firm, at a cost of $30,240.
      (b) Other

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

Utility, janitorial, and maintenance costs estimated at approximately $8 per square foot annually.

2. Programmatic operating expenses directly related to the facility

Salaries and supplies for approximately 60 people estimated at $100,000 per person, per year.

3. Capital equipment not related to construction but related to the programmatic effort in the facility

An estimate of the equipment requirements to maintain the annual programmatic effort. No installations of new programmatic-related capital equipment are anticipated.

4. GPP or other construction related to programmatic effort in the facility

An estimate of the construction requirements to maintain the annual programmatic effort.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 82-D-150

3. Date A-E work initiated: 1st Qtr. FY 1980 a/

3a. Date physical construction starts: 4th Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $25,900
Less amount for PE&D: 1,100 a/
Net cost estimate: $24,800
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 2,500	$ 2,500	$ 2,500	$ 120
1983	5,000 b/	5,000 b/	5,000 b/	2,500
1984	2,900	2,900	2,900	3,620
1985	14,400	14,400	14,400	9,860
1986	0	0	0	8,700

8. Brief physical description of project

This project will provide a new building at the Lawrence Livermore National Laboratory (LLNL) and modifications to two existing buildings. The new Weapons Materials Research and Development Facility will consist of a one-story laboratory area and two-story office area. The gross area of the building will be about 97,000 square feet consisting of about 22,600 net square feet of laboratory space, about 18,500 net square feet of office space, and 15,500 net square feet of miscellaneous space, including a partial basement. The remainder of the area will be in mechanical rooms, utility corridors, reception areas, halls, and restrooms.

The building will be constructed of fire-resistive materials. Laboratory furniture and fume hoods will be provided in the laboratories. Some areas will be designed to provide close temperature and humidity control. Special ventilation

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a/ Funds for design of this project were provided under Project 79-8, Plant Engineering and Design, Various Locations.
b/ Based on Continuing Resolution, Public Law 97-377. Project cost estimates, funding requirements, and schedules may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 82-D-150

8. Brief physical description of project (contd.)

and floor covering will be installed in areas where toxic or radioactive materials are used. Isolated power for some sensitive instruments, emergency power, and electromagnetic shielding in some areas will also be provided. Automatic fire sprinklers, hydrogen alarms, and other safety devices will be installed.

Approximately 5,000 square feet of the existing development and assembly building will be converted to laboratory and office use for welding development and plastics work. Some modifications will also be required in the refractory materials building, primarily to accommodate relocation of the equation-of-state work. Special facilities to be provided by this project include: laser and work stations, dynapak, scanning auger microprobe, ion plating chamber, and powder metallurgy equipment.

Normal site utilities will be extended from nearby sources. Site development will include grading, paving, offstreet parking, fencing, security screens, and landscaping.

The FY 1984 funding requested provides for the continuation of construction and the procurement of special facilities and equipment.

9. Purpose, justification of need for, and scope of project

The present materials research and development facilities at LLNL are marginally adequate for current weapons work and are inadequate for advanced development and future weapons work. Nuclear weapons must be able to survive extreme environments and function reliably over a long stockpile life. In addition, new design demands include smaller, safer, cheaper, and even longer-lived systems. Satisfying any or all of these requirements means solving materials problems and requires the appropriate facilities for advanced materials work.

The current materials science effort at LLNL is constrained by limitations. Many of the existing laboratories are in buildings that are inappropriate for experimental and analytical materials work, thereby compromising the current effort. Sensitive materials-characterization instruments (scanning electron microscopes, electron microprobes, etc.) are widely scattered and are not isolated from vibration and electrical interference. In some cases, computer-controlled experiments and the attending instruments are not isolated from line power fluctuations or provided with access to adequate cooling water. Other technologies simply cannot be accommodated because of space limitations. In addition, 60 percent of the current staff work in trailers, a condition which was prompted more than 15 years ago by the need to move offices out of the permanent buildings so that equipment and laboratories could be better accommodated.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 82-D-150

9. Purpose, justification of need for, and scope of project (contd.)

The weapon systems entering the stockpile today are constructed of materials and by methods that were the state-of-the-art fifteen or more years ago. These technologies are not effectively meeting all present program needs.

The current facility limitations have dictated that applicable advances in nuclear weapons materials technology lag the field as a whole. The capability afforded by this facility will be directed at key areas which support the weapons program, including: stockpile management; generation of prototype hardware and components required for experiments and Nevada tests; materials failure analysis from experiments; tests to support redesign; and substitute materials and processing techniques for use when availability or costs require changes. There are currently a multitude of new materials, ideas, and concepts which are not being pursued because the existing facilities are inadequate. Other technologies have not been developed because the necessary facilities do not exist.

The benefits to be derived by advancing LLNL's materials technology base and by providing the necessary laboratory facilities are straightforward. In a more subtle manner, providing permanent staff housing will also contribute significantly to the weapons programs. This integrated facility brings together the key materials scientists working on the weapons programs. The current overcrowded conditions are eliminated, operating efficiency is enhanced, and security is improved because the "need to know" axiom of classified work can be readily adhered to.

Spaces vacated as a result of the moves into weapons materials research and development facility will be modified to benefit the weapons program; e.g., the materials joining laboratories, a heavily used weapons capability will be expanded as other laboratories are moved into the facility. The existing laboratories to be upgraded and moved to the facility have been carefully chosen on the basis that their current housing cannot be economically upgraded. Thus, the new facility not only provides needed additional space but assures an appropriate environment for much of the specialized equipment necessary for materials research and development.

This facility will provide the environment necessary to expand the current weapons material technology base to attain program goals of:

Increased stockpile life

A primary goal is evaluating weapons currently in the stockpile to predict reliability and lifetime. This facility will upgrade materials characterization technology to improve the ability to specify materials for weapons components and to

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 82-D-150

9. Purpose, justification of need for, and scope of project (contd.)

investigate materials failure modes that are discovered during component testing or stockpile life. Using new characterization instruments, it will be possible to conduct more sensitive accelerated-aging and materials compatibility tests. The predictive information from these tests will enable the agency to upgrade the stockpiled weapons on the necessary timescale.

Weapon safety

The weapons program is committed to nuclear weapons concepts that provide more deployment options with increased safety--a design thrust that is primarily limited by material performance. This facility provides laboratories that can produce a new generation of superior materials meeting the demanding design requirements necessary for safer nuclear explosives. These facilities will aid the development of materials that enable nuclear weapons to be safely contained in aircraft fuel fires. Advances in powder metallurgy technology will significantly benefit the fabrication of complex shapes such as those found in mechanical safe arming devices.

Increased special outputs

The need for weapons having tailored outputs makes demands on both the designer and material scientists. Recent designs have pushed to the limit the existing inventory of metallic alloys and the techniques of joining materials.

Reduced weapon size

Reducing the size and weight of nuclear weapons is heavily dependent on advances in materials technology.

Reduced cost

Cost-effective weaponization of designs is an important goal, and these facilities can potentially reduce the costs of weaponization. For example, in certain weapons designs, the properties of available materials have been limiting factors, and programmatic scientists have relied on extensive engineering design to overcome material limitations. All laboratory facilities are dedicated to produce the next generation of materials and alloys that will significantly reduce the engineering design and testing currently required. Improved materials not only simplify weapon design but improve performance and reliability.

Support of nuclear testing

The nuclear test effort is a key part of the weapons program. This facility is designed so that most laboratories can make prototype hardware for tests in Nevada, in addition to developing new materials technology. This is crucial to advanced development concepts, which rely heavily on state-of-the-art materials capabilities.

OSHA requirement

The agency is committed to provide safe working conditions and to protect the environment. New adhesives and improved composites promise to be much stronger than materials currently in use, but many of these materials are potentially carcinogenic. This project provides funds to upgrade vacated space to safely explore these materials.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California	2. Project No.: 82-D-150

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 9% of construction costs, item b		$ 1,590
(1) Engineering and design (items b.(3) and b.(4) below)	$ 530 b/	
(2) Construction inspection (approximately 5%)	1,060	
b. Construction costs		18,350
(1) Improvements to land including grading, paving, sidewalks, curbs and gutters, fencing, security screens, and landscaping	240	
(2) Building, approximately 87,000 square feet at about $151 per square foot	13,140	
(3) Other structures, modifications of two existing buildings	700	
(4) Special facilities, electron microscope, electric furnaces, press, etc.	3,800	
(5) Utilities including mechanical utilities, sanitary and storm sewers, electrical power, communications lighting, and laboratory waste retention system	470	
c. Standard equipment including office furniture, projection equipment, etc.		1,700
d. Removal cost less salvage (relocate office trailers and scientific apparatus)		460
Subtotal		22,100
e. Contingency at approximately 12% of above costs		2,700
Total estimated cost		$24,800 c/

11. Method of performance

Design is being performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contract awarded on the basis of competitive bids. Minor architect-engineering work, preparation, and activation will be performed by LLNL.

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a/ Based upon completed Title I and Title II design.

b/ The design of building modifications and special facilities will be performed during new building construction.

c/ Excludes $1,100,000 funded from FY 1979 plant engineering and design funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 82-D-150

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 2,620	$ 3,620	$ 9,860	$ 8,700	$24,800
(b) PE&D	1,100	0	0	0	1,100
Total facility costs	$ 3,720	$ 3,620	$ 9,860	$ 8,700	$25,900
2. Other project funding					
(a) Conceptual design	85	0	0	0	85
Total other project funding.............	85	0	0	0	85
Total project funding (items 1 and 2) ..	$ 3,805	$ 3,620	$ 9,860	$ 8,700	$25,985 a/

b. Other related funding requirement (estimated life of project: 40 years)

1. Facility operating costs	$ 480
2. Programmatic operating expenses directly related to the facility	16,270
3. Capital equipment not related to construction but related to the programmatic effort in the facility ..	300
4. GPP or other construction related to programmatic effort in the facility	60
Total other related funding requirements	$17,110

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   2. Other project funding
      (a) Conceptual design

Total funding in this classification represents the conceptual design cost to obtain a budget quality estimate.

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a/ This total includes $85,000 for conceptual design studies prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons materials research and development facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 82-D-150

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

1. Facility operations costs

Operating costs of the facility are estimated to be $480,000 per year including $113,970 escalation (based on FY 1980 average maintenance and utility costs of $4.21 per square foot escalated to 7 percent per annum to $5.52 in the first quarter of FY 1985).

2. Programmatic operating expenses directly related to the facility

This estimate is for 180 total programmatic materials research and development personnel at an annual average of $90,387 per person in FY 1985. Ninety percent of these people are presently housed in existing diverse buildings and trailers and will be moved to this new facility. The operating funds for these people are a normal part of the past and current programs. The remaining 10 percent represents growth projected to FY 1984. Funds for this growth have been included in program projections.

3. Capital equipment not related to construction but related to the programmatic effort in the facility

This is an average annual estimate which includes both the small items needed for continuous operation of the facility and the occasional large item (over $200,000), which cannot be described at this time but can be predicted as needed to maintain technical excellence in efforts conducted in the facility.

4. GPP or other construction related to programmatic effort

Initially, no GPP costs are anticipated, but to keep abreast of technology, presently undefined alterations will likely be required in the future.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Radioactive liquid waste improvement, Los Alamos National Laboratory, New Mexico

2. Project No.: 78-16-g

3. Date A-E work initiated: 4th Qtr. FY 1978

3a. Date physical construction starts: 3rd Qtr. FY 1979

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $12,500
Date: 12/78

6. Current cost estimate: $12,500
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978	$ 600	$2,800	$ 600	$ 25
1979	5,700	5,700	7,900	213
1980	6,200	4,000	4,000	434
1981	0	0	0	5,023
1982	0	-3,500	-3,500	2,908
1983	0	0	0	397
1984	0	3,500 a/	3,500	1,800
1985	0	0	0	1,700

8. Brief physical description of project

This project is required to improve the radioactive liquid waste collection and transportation systems at the Los Alamos National Laboratory.

Approximately 22,000 feet of encased sewer line (pipe in pipe) will be installed complete with manholes at critical points and instrumentation to detect leakage. The system will include gravity main sections and a section of inverted siphon. Also included will be installation of a dosing system to provide for high-velocity flow from the siphon through the balance of the system to the treatment plant.

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a/ In FY 1981, $3,500,000 was deferred to FY 1982 from this project to support an FY 1981 supplemental for an Augmented Test Program. The $3,500,000 was not restored in FY 1982.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive liquid waste improvement, Los Alamos National Laboratory, New Mexico

2. Project No.: 78-16-g

8. Brief physical description of project (contd.)

An electronic multiplexing and display system will be installed and will provide approximately 100 signals necessary for the operation, monitoring, and reliability assurance of the entire waste collection and transportation system.

Four tank trailer loading stations will be constructed complete with storage tanks for waste accumulation pumps and concrete pads. A truck unloading station will be incorporated into one of the junction boxes in the transport line at a location remote from heavily traveled throughfares.

This project will also provide for additional work on components of the existing radioactive waste collection system such as upgrading existing storage tanks by cleaning, repairing, and sealing; structural inspection; installing leakage monitoring wells, and providing instrumentation for transmission of liquid level data. This effort will include reclassifying a number of subsystems presently receiving nonradioactive and chemically insignificant wastes, and rerouting these subsystems from the industrial system to the sanitary sewer system.

In addition to the work outlined above, the system components no longer required will be disposed of in an acceptable manner. This will include removal and disposal of all contaminated sewers (including sections of line previously abandoned) associated manholes, valves, valve boxes, tanks, the existing pumping station, other equipment, and contaminated earth.

The requested FY 1984 funds will be used to remove and dispose of existing contaminated sewers and related materials and equipment.

9. Purpose, justification of need for, and scope of project

This project is required to upgrade the radioactive liquid waste collection and transportation systems at the Los Alamos National Laboratory and to reduce the probability of release of such wastes to the environment.

The existing system has developed leaks and has deteriorated to such an extent that reliability of containment is questionable. Some elements of the existing system are as much as 25 years old. A leak developed in a section of the line, resulting in an uncontrolled release of radioactive substance to the local environment. Subsequent cleanup and inspection revealed numerous leaks from joints in the line and a general deterioration of the system. The original specifications under which the line was installed did not require a leak-tight system, an approach which was acceptable at the time of original installation. Upon discovery of leaky joints in the line currently in service, immediate action was taken to install a temporary line to provide an alternate flow route bypassing the section of major concern. This project provides for correction of the overall problem. Existing sewer lines and associated equipment to be abandoned by this project, as well as lines abandoned in the past by operational changes, are contaminated and will require removal and disposal as contaminated waste.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive liquid waste improvement, Los Alamos National Laboratory, New Mexico

2. Project No.: 78-16-g

9. Purpose, justification of need for, and scope of project (contd.)

The resulting improved systems to be constructed under this project will provide practical assurance that radioactive waste material will not leak into the environment. Additionally, in the event of system or component failure, such failure will be immediately detected. The function of the system is to provide for collection and transport to the waste treatment facility of low-level radioactive and acidic industrial wastes generated in various laboratory facilities. This is presently accomplished principally by a collection system of gravity acid waste piping to the terminal point at the waste treatment plant. At remote facilities, transport is accomplished by tank truck hauling from collection points to the treatment plant. The new system will be similar. However, components will be of much more reliable design, and the force main feature has been eliminated In addition to the new line collection system, facilities remote from the line collection area will be provided with improved holding tanks and tank truck filling stations. A special liquid waste tank trailer will be provided for hauling waste to the treatment plant.

It is not anticipated that annual operating costs of the new waste collection and transportation system will vary significantly from those associated with the existing system. Some cost savings may be realized from more efficient waste handling at remote points (i.e., transfer of wastes from bulk storage to truck), but sufficient data have not been developed to the point where such savings can be accurately quantified.

10. Details of cost estimate a/

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 14% of construction costs, item b		$ 980
b. Construction costs		6,920
(1) Utilities		
(a) Grading and site preparation	$ 50	
(b) Trailer stations and trailers	430	
(c) Equipment rehabilitation and reclassification	320	
(d) Piping systems	5,440	
(e) Instrumentation	680	
c. Removal cost less salvage (removal and disposition of existing piping systems)		4,350
Subtotal		12,250
d. Contingency at approximately 2% of above costs		250
Total estimated cost		$12,500

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive liquid waste improvement,
Los Alamos National Laboratory, New Mexico

2. Project No.: 78-16-g

11. Method of performance

Design and inspection will be accomplished by a negotiated architect-engineer contract and by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 9,000	$ 1,800	$ 1,700	$12,500
Total facility costs	9,000	1,800	1,700	12,500
2. Other project funding				
(a) Conceptual design	40	0	0	40
Total other project funding	40	0	0	40
Total project costs (items 1 and 2)	$ 9,040	$ 1,800	$ 1,700	$12,540

b. Other related funding requirements (estimated life of project: 30 years)

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design was completed in FY 1976 at a cost of $40,000.

b. Other related annual funding requirements (estimated life of project: 30 years)

No narrative is required in this area because the additional facilities provided under this project will not increase the operating costs or capital equipment requirements above the normal operating costs of the existing facility.

FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1990

5. Previous cost estimate: None
Date:

6. Current cost estimate: $600,000 a/
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 38,500	$ 38,500	$ 38,500	$ 20,500
1985	150,000	150,000	150,000	74,900
1986	150,000	150,000	150,000	123,500
1987	150,000	150,000	150,000	166,500
1988	111,500	111,500	111,500	126,500
1989	0	0	0	69,700
1990	0	0	0	18,400

8. Brief physical description of project

This project provides for the construction of new facilities; modifications, relocations, and additions to existing facilities; and new and replacement equipment for the revitalization of the nuclear weapons testing complex at the Nevada Test Site (NTS), the North Las Vegas ATLAS Facilities, the Los Alamos National Laboratory (LANL), the Sandia National Laboratories (SNL),

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a/ This total estimated cost is a management planning number developed after considering the January 1982 recommendations of the Nuclear Test Revitalization Study Task Group and the June 1982 recommendations of the Independent Assessment Team. This estimate is based upon judgments as to what are the overall programmatic capital needs to achieve a long-term, balanced nuclear test program. The final scoping and identification of projects and their related dollar costs to be included in the test revitalization project will be an ongoing process during the next year as additional conceptual designs mature and more detailed cost estimates are completed on all proposed projects. No firm decision has yet been made to proceed with revitalization projects located at the three weapons laboratories within this construction line item. This could, therefore, result in a subsequent reduction to the total estimated costs for this line item. The estimates for projects that are being identified for FY 1984 funding are based on completed or nearly completed conceptual design reports.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations
2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

and the Lawrence Livermore National Laboratory (LLNL). This project is a multiyear capital investment program to provide new or additional capacities or capabilities to the nuclear weapons testing complex. These new or modified facilities will replace or add to existing facilities which are overaged and deteriorated. Equipment requirements are related to the added capacity/capability needed to support the research, design, and development of the many activities which makeup a full-scale, balanced test program and analysis of the materials and data obtained from such a test program. In addition to providing facilities and equipment in direct support of the test program, the project also provides for necessary upgrades for environmental, safety, and health requirements.

The following briefly identifies the high priority subprojects at NTS and the North Las Vegas ATLAS Facility which are to be initiated in FY 1984. In addition, the purpose and justification are briefly described under each subproject.

Nevada Test Site and North Las Vegas ATLAS Facility, Nevada

a. Field Engineering Complex, North Las Vegas, Nevada
(TEC $34,400,000; FY 1984 funding $3,500,000)

This subproject will provide building space of 240,000 square feet and related utilities located on 30 acres of private land to be purchased adjacent to the North Las Vegas facility. A paved parking area for 900 vehicles of 310,000 square feet and a paved staging area for instrumentation trailers of 150,000 square feet will be provided. This facility will house personnel involved in preevent staging and diagnostics activities and will provide management, administrative, technical, computer, warehousing, and general support space.

The need for this new facility primarily results from the expanded programmatic support needs of LANL, LLNL, and SNL. The facility will permit consolidation of the following contractor (EG&G) functions: LLNL Engineering and Prestaging; LANL Engineering and Prestaging; SNL and Department of Defense (DOD) Engineering; General Technical Services; Research and Development; Administration; and Engineering Measurement Group Management Headquarters. EG&G support to LANL is experiencing a substantial employee turnover (25 percent annually), largely due to commuting time to NTS. The LANL test diagnostics effort has a critical need to attract and retain highly qualified EG&G support work force. A Las Vegas facility to allow some preevent staging for LANL events, in addition to other diagnostics station work, would aid in this regard. In addition, it would be more desirable and efficient to prestage in Las Vegas rather than NTS, due to the evolution of the LANL diagnostic system to digital recording techniques. A lack of an adequate preevent staging area and engineering complex in Las Vegas, coupled with a deterioration in qualified EG&G personnel, in the future could result in costly event delays and/or loss of valuable diagnostic data.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations	2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

The LLNL space requirement is driven by current overcrowded conditions and the need to support new multiparameter diagnostic systems and increased mechanical fabrication activities. Additional space for shipping/receiving/storage is needed for all programs. Adequate working space for personnel without security clearance is also needed to conform to Department of Energy (DOE) security, safety, and property control procedures.

The proposed facility is also required to replace the present EG&G Sunset Road facility. The need for this replacement is driven by expanded program requirements; the inadequacy of existing space as related to operational requirements; and the pending condemnation of the existing facilities due to a planned new runway at McCarran International Airport. A new runway will be added on land presently occupied by this facility.

b. Test Facilities Revitalization, NTS
(TEC $26,000,000; FY 1984 funding $26,000,000)

This subproject will initiate the revitalization at the NTS in five major functional areas: (1) reconfigure forward area camps to replace existing substandard, overcrowded camps and to freeup prime test real estate; (2) develop Pahute Mesa by providing some permanent facilities, utilities, and improved roads; (3) test execution support by upgrading facilities to accommodate larger diameter devices and canisters; (4) replacing common support facilities such as fire houses, health facilities, warehouses, and craft shops; and (5) initiating an effort to expand and replace personnel support facilities such as housing, dining halls, and recreation facilities.

(1) Reconfigure Forward Camp Areas

The objective of this development plan calls for: (1) relocating facilities in order to access test property; (2) providing larger and more cost-efficient office, shop, and equipment complexes in alternate locations; (3) upgrading and relocating related utilities and access roads; and (4) eliminating substandard facilities.

(a) Event Power System Upgrade
(TEC $3,500,000)

This subproject will provide six 2,500 kVA transformers which will transport power from the existing 34.5 kVA overhead power line to thirty-six 300 kVA distribution transformers at ground zero event locations.

The power system upgrade is vital for LANL to conduct its test program since the current power configuration is an underground distribution system which has experienced severe deterioration as a result of age and ground motion. System failures and insufficient voltage to event sites are being experienced with increased frequency. These power outages and voltage fluctuations damage electronic recording equipment calibration and affect test signals used in diagnosing nuclear weapons test results. These conditions extend the event times; checkouts take longer; and, more importantly, they increase the risk of receiving erroneous or possibly no data from a test.

8. Brief physical description of project (contd.)

(b) Field Operations Support Facility
(TEC $2,360,000)

This subproject will provide in the LANL test support area a new 16,000-square-foot preengineered metal building to house laboratory, contractor, and agency personnel.

There are currently 75 supervisory, professional, and clerical personnel housed in deteriorated and crowded trailers disbursed throughout the LANL test support complex. The current trailers have exceeded their use life by 200 percent, are costly to maintain and operate, uncomfortable, and not readily or cost effectively modified. In addition to consolidating personnel and the efficiencies to be gained, the facility will house the 40 percent growth in personnel which is planned in the next several years as a result of programmatic changes.

(2) Develop Pahute Mesa

The objective of this development plan calls for: (1) the paving of the two access roads; (2) establishment of permanent materials and equipment storage facilities; (3) establishment of decontamination and heavy equipment service facilities; (4) upgrading of power systems to support multiple events; (5) installation of a permanent water system along with supporting industrial, fire protection, and domestic requirements.

(a) Pave Pahute Mesa Road
(TEC $5,040,000)

This subproject will provide for the improvement of about 21 miles of Phute Mesa Road starting in NTS. The subproject provides for resurfacing of the first 8 miles of the existing 26-foot-wide asphalt road and grading of new 8-foot-wide gravel shoulders. The remaining 13 miles will be constructed to the same specifications. Striping, traffic control signs, and drainage culverts will be included in the project. The surface and roadbed will support heavy truck/equipment traffic.

Pahute Mesa Road is the primary access to Pahute Mesa Test Areas. Approximately 40 percent of the weapons test program will be conducted on the Mesa by 1984. Many sections of the existing 8 paved miles are heavily potholed and washboarded and the rest is unpaved. These conditions make travel unsafe at speeds above 25 miles per hour. The deterioration and unpaved roads increase fuel consumption, raise vehicle maintenance costs, and require long leadtimes for equipment deliveries to event sites. The increased testing level on the Mesa will require the transportation of approximately 500 personnel daily, along with support vehicle and equipment traffic, which makes paving the Mesa Road a critical project if the Mesa is to be a major test area.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

(3) Test Execution Support

The objective of this development plan calls for: (1) upgrading facilities capability and capacity to handle additional and larger devices and canisters; (2) upgrading facilities used for equipment research and fabrication, calibration, installation, and monitoring to service the proposed balanced test program.

(a) Diagnostic Assembly Tower
(TEC $5,380,000)

This subproject will provide a portable diagnostic assembly tower for LANL's use at NTS. The tower will be a 20-foot by 20-foot by 200-foot space truss tower composed of five 30-foot modules, one 27-foot module, and one 23-foot module. In addition, there will be an electric-driven rack and pinion passenger/freight elevator with a 6,000-pound capacity independent support mast and a 500,000-pound capacity hydraulic hoist for moving racks to the vertical position.

The tower will provide for the assembly and alignment of diagnostic test equipment which collects data on nuclear weapons tests and provides a weatherproof work area for technicians, hardware, and specialized electronics equipment. A fixed amount of time is required for this process for each event, and this additional tower will allow work to be carried on for several events simultaneously. In addition, this tower is required to provide the added capacity to execute a balanced test program, as well as to provide the required capability to support a 98-inch diameter by 165-foot long diagnostic rack and nuclear device and the associated heavier weights. Current towers will not accommodate the canisters planned for use in the program. Further, an additional tower is needed to support the additional number of tests to be conducted on the Mesa.

(b) Staging Assembly Tower
(TEC $6,650,000)

This subproject will provide a twin tower for use by LLNL at the North Las Vegas ATLAS Facility. It will provide a 25-foot-wide, by 62-foot long, by 135-foot high tower with two overhead hoists, four fracture safe steel columns, and a concrete block enclosure. The tower will be equipped with an elevator, alignment scopes, and welding equipment.

The tower will provide for the assembly and alignment of diagnostic test equipment which collects data on nuclear weapons tests and provides a weatherproof work area for technicians, hardware, and specialized electronics equipment. A fixed amount of time is required for this process for each event and this twin tower will allow work to be carried on for several events simultaneously. The LLNL test program has moved to heavier and larger diameter devices and canisters, and this trend will continue. The current staging assembly tower is not adequate

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

to handle these packages, and an increased test level under a balanced test program would require that assembly be performed on several devices simultaneously. The new twin tower is required to add operating capacity to handle devices in parallel and to add capability to handle larger and heavier packages.

(4) Personnel Support Facilities

The objective of this development plan calls for: (1) upgrading the form of housing, dining halls, and recreation facilities; (2) the plan's initial phasing calls for the construction at Mercury of approximately fifty-five 12-foot by 20-foot rooms with individual restroom and shower facilities in a 2-story building. The building will have a lobby, a laundry room with two washers and dryers, a mechanical equipment room, and a janitor's room. The building will be of fire-resistant construction and will be provided with a sprinkler system. Each room will be approximately 240 square feet in area and will be electrically heated and air-conditioned.

(a) Mercury Dormitories
(TEC $3,070,000)

This subproject will provide for the construction at Mercury of fifty-five 12-foot by 20-foot rooms with individual restroom and shower facilities in a 2-story building. The building will have a lobby, a laundry room, a mechanical equipment room, and a janitor's room.

These 55 units will replace a portion of the current 4-bed/shared bath trailers, which constitute 60 percent of the housing available at Mercury. The trailer units to be replaced have exceeded their use life by 200 percent, are in violation of DOE fire regulations, and do not provide appropriate or adequate accommodations for personnel who are TDY to NTS or who must stay on location because of work schedules and operating procedures. The NTS users and contractors believe that adequate, comfortable housing affects the calibre of personnel who they are able to attract and retain to work on the nuclear weapons test program.

Improved accommodations are required at the NTS to provide adequate living quarters for scientific and professional personnel who are required to reside at the NTS on a recurring semipermanent basis and also to provide adequate quarters for the permanent Mercury population. Existing housing at Mercury consists of: old trailers; wooden communal-type dormitories; concrete block bachelor officer's quarters; and two-story, motel-type dormitories. The acceptable bachelor officer's quarters and motel-type facilities will accommodate only 230 persons. During the first five months of FY 1981, the average monthly peak overnight population was 750 persons. Thus, the monthly peak population exceeds by approximately 350 percent the space available in acceptable facilities. The peak population during an augmented test program is expected to be approximately 1,100 and will severely aggravate the situation.

	FY 1983 Appropriation	FY 1984 Request
Inertial Confinement Fusion	$ 189,750	$ 151,800

Inertial confinement fusion is a research and development program directed toward demonstrating the feasibility of burning very small masses of thermonuclear fuel using lasers or particle beam generators as the driver. Understanding of the physics of small fuel-mass burn can assist the nuclear weapons research, development, and testing activity by providing measurements of materials properties at very high densities and temperatures; data on processes occurring in the implosion of fuel masses; and simulation of some nuclear weapon effects.

If sufficiently small fuel masses can be ignited using laser or particle beams, inertial fusion will also have the potential of being, in the long-term, an inexhaustible energy source. The key uncertainties in physics understanding are the same for both weapon technology and energy applications. An integrated program plan has been developed for establishing over the next five to six years an adequate data base for understanding the precise requirements in beam energy and target design to ignite targets using very short wavelength lasers, long wavelength lasers, or light ion beams generated in pulse power machines.

The program plan includes the completion of the large facilities in progress at the three lead laboratories: the ANTARES gas laser facility at the Los Alamos National Laboratory, the NOVA glass laser facility at the Lawrence Livermore National Laboratory, and the Particle Beam Fusion Accelerator-II (PBFA-II) facility at Sandia National Laboratories, Albuquerque. In concert with the facility construction, it is planned to conduct experiments both by the lead laboratories and by the major supporting laboratories in order that an adequate data base will be available for the effective use of the large machines as they come into operation in the FY 1984-1986 time frame. The glass laser experiments activity is supported by KMS Fusion, the Laboratory for Laser Energetics of the University of Rochester, and the Naval Research Laboratory. The Naval Research Laboratory also supports the pulse power activity at Sandia in the development of diodes - the element that produces the ions. Following the operation of the three major facilities, a programmatic decision will be made on the appropriate technology to pursue.

In addition to beam-target experiments, the program includes the classified HALITE/CENTURION activity.

Recent accomplishments in the inertial confinement fusion program include:

- Pulse power beam focusing reaching two terawatts per square centimeter, doubling the power concentration previously achieved with ion beams.
- Acceleration of cold, dense material to nearly the requisite velocity and uniformity for inertial fusion ignition (160 km per second), demonstrating stable ablative acceleration of a flat target.
- Development of a consistent and comprehensive electromagnetic theory of electron generation and transport at a target surface.
- Conducting the first direct illumination compression experiments, demonstrating enhanced performance of solid (cryogenic) deuterium-tritium capsules.
- Demonstration of large-scale efficient harmonic conversion of glass laser light, permitting definitive examination of short wavelength target performance.

	FY 1983 Appropriation	FY 1984 Request
OPERATING EXPENSES	$ 140,000	$ 127,100

The requested funding of $127,100,000 in operating expenses supports the Inertial Confinement Fusion experimental program to be conducted in FY 1984. As newer facilities with greater power and experimental capability are completed, the older, smaller machines are being removed from the program providing needed operating funds for the inertial fusion experimental effort.

Glass Laser Experiments	$ 75,100	$ 70,400

In FY 1984, the primary experimental capability in short wavelength laser interaction experiments will be the NOVETTE two-beam frequency converted glass laser at the Lawrence Livermore National Laboratory. NOVETTE will begin experiments at the second harmonic (green) wavelength early in FY 1983 with energy on target about two orders of magnitude greater than was previously available at wavelengths shorter than one micron. In the period preceding the operation of the ten-beam NOVA, a number of key experimental milestones are expected to be accomplished on NOVETTE. The milestones include:

- achievement of compression of fuel in targets to 200 to 400 times liquid hydrogen density (2 to 4 times that achieved in previous experiments); and
- demonstration of a suitable high-compression target design for NOVA experiments.

NOVETTE will also be utilized for weapon physics experiments, including measurements of materials properties, and for specific experiments supporting research for the weapons program. NOVETTE is scheduled to be shut down in the second half of FY 1984 prior to the activation of NOVA.

The major supporting laboratories--KMS Fusion, the University of Rochester, and the Naval Research Laboratory--extend the talent and resource base of the program and provide capabilities that are not available in the mainline programs at the nuclear weapon laboratories--e.g., the pellet fabrication capability of KMS Fusion meets requirements of other participants in the program, and the highest power laser now available for direct illumination of targets is that at the University of Rochester. Further, experimental work on a number of critical issues has been pioneered at these laboratories: efficient short wavelength conversion of glass lasers at the University of Rochester, short wavelength illumination experiments and cryogenic targets at KMS Fusion, and ablative acceleration of flat targets at the Naval Research Laboratory.

In FY 1984, the supporting laboratories are planning to continue their established roles.

KMS Fusion will:

- Fabricate targets.
- Conduct first and second harmonic glass laser experiments, including direct illumination of cryogenic targets.

University of Rochester will:

- Conduct direct illumination target experiments focusing on beam uniformity requirements and wavelength smoothing.
- Operate the OMEGA laser for the National Laser Users Facility.

- Train graduate students and interface with the academic community.

Naval Research Laboratory will:

- Use planar targets to study broad bandwidth control of plasma instabilities.

- Conduct target interaction experiments.

	FY 1983 Appropriation	FY 1984 Request
Gas Laser Experiments	$ 41,800	$ 38,200

Long wavelength laser experiments are being conducted on the HELIOS carbon dioxide gas laser at Los Alamos. The critical technical issue at long wavelengths is that much of the beam energy is converted to very hot electrons which preheat the fuel. Since FY 1981, HELIOS has been operating at a high rate of experimentation which has provided a large data base on the behavior of carbon dioxide laser driven targets up to 10 kilojoules.

During FY 1982, a major advance was made in understanding the behavior of electrons created in the target region by the interaction of intense laser light with the target surface. On the basis of this improved understanding, several novel target designs have been developed at Los Alamos with the potential of increasing the efficiency of fuel compression. During FY 1983, an intensive effort will be carried out on HELIOS to evaluate which of these new target designs is suitable for experiments at the 40 kilojoule energy level using ANTARES.

ANTARES construction funding is now complete, the target chamber and beam transport system have been installed, and one of the two laser power amplifier modules has been repeatedly tested successfully. The laser system is scheduled to begin operation by the end of FY 1983. HELIOS will no longer be used by the Inertial Fusion program beyond FY 1983. The Los Alamos Target Fabrication Facility will be completed in FY 1983 to provide targets for ANTARES experimental requirements, and the Sandia pulse power program.

The milestones for the gas laser experiments activity in FY 1984 include:

- activation of ANTARES to include instrumenting the target chamber;

- design and fabrication of the optimized ANTARES targets; and

- initiation of 40 kilojoule experiments on ANTARES.

The program plan calls for a decision on the acceptability of the carbon dioxide laser as an inertial fusion driver after FY 1985 based on data obtained in FY 1984 and FY 1985.

	FY 1983 Appropriation	FY 1984 Request
Pulse Power	$ 20,000	$ 18,500

Application of pulse power technology to fusion requires the development of ion sources from which beams of light ions are extracted and concentrated on millimeter-sized targets to achieve high-power density of the order of 50 terawatts per square centimeter (TW/cm^2). This specific milestone is the goal of the PBFA-II now in the design stage at Sandia, Albuquerque. A series of small machines has demonstrated successively higher levels of power concentration through increased stored energy and improved diode design. Calculations indicate that PBFA-II could drive targets to ignition conditions provided that the ions can be sufficiently focused. The key challenge remaining is demonstration of this capability.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

During peak activity periods, housing scientific and technical personnel in Mercury has two advantages over accommodations in the nearest motels, which are 65 miles away in Las Vegas. First, motel accommodations in Las Vegas would represent a substantial cost to the Government. Second, the traveltime (about 2-1/2 hours per day) has a negative effect on efficiency and productivity, especially when these personnel are on extended workdays.

Test Revitalization Capital Equipment, NTS
(FY 1984 funding $9,000,000)

The FY 1984 funding requirement includes the subproject for revitalization of the capital equipment base at the NTS. Equipment needs at the NTS are important, and in many cases, critical to achieving a balanced testing program.

The Nevada Operations Office equipment requirements cover a broad spectrum of items which include sophisticated diagnostic recording, communications, heavy equipment, security, automated data processing, office, and the largest vehicle fleet in the DOE. There are over 45,000 items included in this inventory which, for the most part, is spread over 1,350 square miles of the NTS. Much of the equipment is subject to the climatological extremes of the desert environment, as well as ground shock from nuclear underground tests. A high percentage of the equipment is moved frequently over unimproved roads and rough terrain. All of these factors combine to reduce the useful life of NTS equipment.

Recent years have seen significant advance in technology which should be used in diagnosing the performance of nuclear weapon designs. The use of digital equipment, new television cameras, fiber optic techniques, radiochemical detectors, and improved equation-of-state measurements could provide the weapons designer with a larger fraction of the information which is needed to improve weapon designs.

The equipment requirement needs also take into account the increased test rate and the need to support the increased rate under a long-term balanced advanced physics and weaponization test program.

The FY 1984 funding request is $38,500,000; $29,500,000 will be used for the design, procurement, and construction of facilities and roads; and the remaining $9,000,000 will be used for the design, procurement, and fabrication of critically needed equipment at the NTS and North Las Vegas ATLAS Facility, Nevada.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

9. Purpose, justification of need for, and scope of project

This project will provide for initiating the most urgent projects of a multiyear program to revitalize the capital asset base of the nuclear weapons testing complex to assure the capacity and capability of the complex to achieve and maintain a balanced annual test program on a long-term sustainable basis. The planning estimate for this effort over the next 4 or 5 years is about $600 million in escalated dollars, including line item construction subprojects, small construction subprojects (less than $1,000,000), and capital equipment.

The need for a test complex revitalization program was identified in a study completed in January 1982. The study was conducted by a task force comprised of representatives from the Office of Military Application, Nevada Operations Office, and the three weapons laboratories. All aspects of the test complex capital asset base were critically reviewed during the study and priority resource requirements were developed by year and site within the context of achieving and sustaining a balanced, long-term test program in excess of the FY 1981 level of testing.

Several factors have contributed to the current situation. One such factor is the history of the overall test program itself. The history has been one of great fluctuations and very dynamic programs. These programs have fluctuated over the years due to political uncertainties and shifts in national policy relating to underground nuclear testing and nuclear deterrence. Many of the NTS facilities are temporary and were built 10-20 years ago and are now completely overage and deteriorated. Within the laboratories, capital funding for facilities dedicated to the test program has been sporadic at best. Many facilities now in use were built originally for other purposes.

Another factor is the combination of increased complexity and workload confronting the program. To a large extent, the requirements for information in the test program mirror the pace and scope of the underlying research and development effort. As designs become more complex and the frontiers of technology are pushed out further in the laboratories, more information of increasing detail is required from each experiment associated with a device test. Today's device tests are much more complicated than tests conducted 10 years ago. Couple this with an overall increase in the agency and work for others testing workload, and it becomes obvious that additional diagnostic capacity and capability will be necessary at the NTS and the laboratories if the test program is to continue to support the research and development process in a timely and effective manner.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations
2. Project No.: 84-D-107

9. Purpose, justification of need for, and scope of project (contd.)

Technology changes are another factor contributing to the need for facilities and equipment. This relates directly to the designer's need for more precise measurements over broader energy spectra. The technology to meet these requirements exists today and can be cost effectively incorporated in the program to assure maximum scientific output.

The last major factor driving the need for the test complex revitalization effort is the nature and geography of NTS. Many of the NTS facilities were placed in their present locations many years ago to serve a purpose that was appropriate at that time. As test real estate has been used up, some of the facilities, in addition to being old, are not presently in the most advantageous location. Some facilities actually occupy prime test real estate, which as time goes by, is becoming more precious. The lack of real estate at Yucca Flat is beginning to force more tests to Pahute Mesa, especially for those tests near the Threshold Test Ban limitation of 150 kt. Future projects show as much as 1/3 to 1/2 of the test program being conducted on Pahute Mesa. This condition will require new and upgraded facilities in that area in order to keep operating costs down. Facilities are needed in Las Vegas in order to reduce the number of people who have to travel the 70-120 miles to the test site. It has been proven that much of the experimental assembly work can be accomplished in Las Vegas and then moved to NTS for final adjustments, alignments, etc. These facilities are needed in order to attract and maintain the most capable people for the program. Better housing, eating, and recreation facilities are needed at NTS because: (1) many of the existing facilities are substandard and (2) today's top engineers, scientists, technicians, and craftsmen cannot be attracted to NTS jobs, if they must use existing facilities. Some additional facilities are required because of the added workload imposed by the increased test program, coupled with other work being performed at NTS.

Without a substantial capital investment over the next 4 or 5 years, the capacity and capability of the testing complex to achieve and maintain a balanced test program on a sustained basis will be jeopardized. The funding requested in FY 1984 by this project will provide for only a few of the more critical line item construction project requirements necessary to support the objective of achieving and sustaining a balanced, long-term test program.

The weapons testing program is subject to many interrelated dynamic forces, including political, military requirements, natural phenomenon, and the uncertainties associated with any advanced research, development, and testing program. Due to this dynamic environment, assignment of priorities is difficult and will be subject to constant reevaluation throughout the duration of the test revitalization program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

10. Details of cost estimate a/

a. Engineering, design, and inspection	$600,000
b. Construction costs	
(1) Improvements to land	
(2) Buildings and building modifications	
(3) Other structures	
(4) Special facilities	
(5) Utilities	
c. Standard equipment	
d. Removal cost less salvage	
e. Contingency	
Total estimated cost	$600,000

The estimates by location are as follows:

Nevada Test Site and North Las Vegas ATLAS Facility, Nevada	$329,600
Los Alamos National Laboratory, New Mexico	82,200
Lawrence Livermore National Laboratory, California	130,600
Sandia National Laboratories, New Mexico	57,600
Total	$600,000

11. Method of performance

Design and procurement of the conventional facilities will be performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding. Design and procurement of the special facilities will be performed by the operating contractor.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding									
1. Total facility costs									
(a) Construction line item	$ 0	$ 20,500	$ 74,900	$123,500	$166,500	$126,500	$ 69,700	$ 18,400	$600,000
Total facility costs	0	20,500	74,900	123,500	166,500	126,500	69,700	18,400	600,000

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a/ Based upon completed and partially completed conceptual designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations
2. Project No.: 84-D-107

12. Pending schedule of project funding and other related funding requirements (contd.)

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	Total
2. Other project funding									
(a) Conceptual design	$ 2,000	$ 500	$ 500	$ 0	$ 0	$ 0	$ 0	$ 0	$ 3,000
(b) Other project related funding	0	0	0	0	0	0	0	0	0
Total other project funding	2,000	500	500	0	0	0	0	0	3,000
Total project funding (items 1 and 2)	$ 2,000	$ 21,000	$ 75,400	$123,500	$166,500	$126,500	$ 69,700	$ 18,400	$603,000 a/

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design cost of $3,000,000 is necessary to develop a budget quality cost estimate and construction schedule.

(b) Other related funding requirements

The estimated programmatic life of these facilities varies by site and subproject.

The other related funding requirements for these facilities are not considered to be significantly different from those of the facilities and equipment being replaced by this project. Therefore, no costs are shown.

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a/ This total includes $2,000,000 which is from years prior to FY 1984.

An alternative approach being explored at Sandia is the SCORPIO concept in which a pulse of stored electrical energy is deposited in a thin cylindrical foil, generating x-rays. Foil experiments are being conducted on the PROTO II machine at Sandia. Experiments in FY 1984 will be directed toward definitive evaluation of the efficiency of conversion of pulse power directly into x-rays using an upgraded PROTO II.

Ion diode experiments are underway on PROTO I, an earlier machine, and on PBFA-I completed in 1980. The ion diode experiments utilize alternative ion source designs developed at Sandia, the Naval Research Laboratory, and Cornell University. Los Alamos has provided support for target design, fabrication, and diagnostics for PBFA-I target experiments begun in FY 1983. In FY 1984, PROTO I will be shut down.

The key milestones for pulse power are:

o achievement of power densities of 5 TW/cm^2 in PBFA-I experiments in FY 1984;

o development in FY 1983 and FY 1984 of a data base from which a definitive comparison of foil and diode power density results can be made; and

o completion of the final design for PBFA-II in FY 1984.

The program plan calls for a decision during FY 1984 on the configuration of PBFA-II either for light ion or for foil experiments.

	FY 1983 Appropriation	FY 1984 Request
Supporting Research	$ 3,100	$ 0

This effort mainly consisting of heavy ion fusion research is transferred to the Office of Energy Research in FY 1984.

	FY 1983 Appropriation	FY 1984 Request
CAPITAL EQUIPMENT	$ 11,000	$ 11,800

Capital equipment is required to support the experimental programs through target fabrication, diagnostics development, and items of equipment required to operate the driver facilities for specific experiments. Much of the equipment is unique to the requirements of inertial fusion and particularly to the type of driver utilized. The requested level of capital equipment will support target experimentation required to make effective use of the available driver facilities.

	FY 1983 Appropriation	FY 1984 Request
CONSTRUCTION	$ 38,750	$ 12,900

Requested in FY 1984 is a $12,900,000 appropriation to continue the PBFA-II at Sandia, Albuquerque. The conventional construction will have been completed. Cost and schedule to complete final design and fabrication of the accelerator are under review. Completion of the facility will permit definitive experiments to determine the feasibility of pulse power driven inertial fusion. In FY 1984 a decision will be made on the configuration of PBFA-II for either light ion or foil experiments. The PBFA-II is being designed to have the power and energy believed to be necessary to drive a target to ignition, provided the requirements for concentration of the energy on the target can be met.

Following is a table listing the construction line item included in the FY 1984 request. Further details on the PBFA-II project may be found in the construction project data sheet.

Inertial Confinement Fusion

Project Numbers	Title	TEC	FY 1983 Appropriation	FY 1984 Request
Prior-Year Projects				
81-D-101	Particle beam fusion accelerator-II, SNLA, NM	$ 42,150 a/	$ 4,250	$ 12,900
78-4-a	High energy laser facility (NOVA), LLNL, CA	176,000	34,500	0
	Total		$ 38,750	$ 12,900

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a/ TEC is under review.

	FY 1983 Appropriation	FY 1984 Request
Production and Surveillance	$1,900,900	$2,337,315
OPERATING EXPENSES	$1,474,500	$1,779,715

Weapons production and surveillance activities involve the procurement of materials (exclusive of nuclear materials); fabrication and assembly of nuclear weapons and weapon components; stockpile maintenance; reliability assessment of the existing stockpile; and development of safe/secure transportation, field transportation, field training manual preparation, and facility standby/startup required to maintain the United States national defense posture as approved by the President.

Funding for the weapons production and surveillance operating expense activities follows:

	FY 1983 Appropriation	FY 1984 Request
War Reserve New Production	$ 912,100	$1,100,300
Stockpile Maintenance	138,900	195,800
Stockpile Evaluation	139,500	145,400
Process Development	79,600	96,600
Other Costs	204,400	241,615
Total	$1,474,500	$1,779,715

	FY 1983 Appropriation	FY 1984 Request
War Reserve New Production	$ 912,100	$1,100,300

This subactivity includes funding required for procurement and/or manufacture of materials, piece parts, and assemblies required in the final assembly of warheads and bombs to be delivered to the Department of Defense in direct compliance with the Nuclear Weapons Stockpile Memorandum covering the budget period as well as future years and for production/process engineering required to support future weapons delivery.

The increase in FY 1984 of $188,200,000 over FY 1983 reflects the continuing growth in production workload associated with the new and, by far, more sophisticated and complex weapon systems entering production.

	FY 1983 Appropriation	FY 1984 Request
Stockpile Maintenance	$ 138,900	$ 195,800

This subactivity includes funding required to maintain weapons and weapon components currently in this Nation's nuclear weapons war reserve stockpile and those to be delivered to the stockpile. Included are the costs associated with repairing nuclear weapons and significantly modifying or modernizing older nuclear weapons in the stockpile. Funding is also provided to procure, fabricate, and assemble material and piece parts into weapon components which will be used to replace like components having limited life, including special nuclear materials. The costs incurred to retire and disassemble nuclear weapons from the stockpile are also funded under this subactivity.

The increase in funding of $56,900,000 over FY 1983 for this subactivity is primarily to accomplish the FY 1984 portion of the Stockpile Improvement Program. The Stockpile Improvement Program accounts for $54,920,000 of the increase. The Stockpile Improvement Program was initiated to incorporate the latest advances in weapon systems into older, stockpiled weapons which are not scheduled to be retired in the immediate future.

The remainder of the increase, $1,980,000, is associated with the fabrication or procurement of limited-life components for those systems currently in production.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities - Plant and Capital Equipment
Atomic Energy Defense Activities
Inertial Confinement Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

3. Date A-E work initiated: 4th Qtr. FY 1979

3a. Date physical construction starts: 1st Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1985 1/

5. Previous cost estimate: $ 40,650
Date: 1/82

6. Current cost estimate: $ 44,650
Less amount for PE&D: 2,500
Net cost estimate: $ 42,150 1/
Date: 1/83

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1981	$36,750	$ 5,000	$ 4,984	$ 2,168
1982	0	20,000	20,016	2,289
1983	0	4,250	4,250	10,100
1984	5,400	12,900	11,000	3,076
1985	0	0	1,900	24,517

8. Brief physical description of project

This project provides for the construction of the Particle Beam Fusion Accelerator-II (PBFA-II) and the necessary laboratory space required to support the expanded capability of the Particle Beam Fusion Program. The laboratory building consists of a 21,000-square-foot, high-bay area to house the accelerator and provide adequate maintenance and experimental staging area. The building also contains support facilities consisting of light laboratory space, restroom facilities, mechanical equipment rooms for conventional facility electrical distribution and HVAC systems and specialized liquid pumping systems for PBFA-II, a specialized maintenance area for refurbishing small accelerator components, and a shielded enclosure for the data acquisition/data processing system and the control/monitor center. The site work includes a parking lot, relocation of the perimeter fence, and paving streets within the complex. A new primary substation will be required to support the expanded capabilities. Water, sewer, natural gas, and underground power will be extended and/or relocated, as required. The PBFA-II accelerator will require expanded storage, transfer, and processing systems for liquid dielectrics; i.e., transformer oil and deionized water and various insulating gases (sulfur hexafluoride (SF_6), argon-SF_6 mixtures, etc.)

1/Cost and schedule to complete final design and fabrication of the accelerator are under review.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico	2. Project No.: 81-D-101

8. Brief physical description of project (contd.)

The PBFA-II is physically configured similar to the existing PBFA-I. The accelerator consists of multiple, individual modules arranged in a radial configuration with a centrally located pellet chamber. Each module contains a Marx generator, a pulse forming/voltage conditioning section, and a power flow/front-end section. The multimodule accelerator is housed in a large, single-tank structure approximately 106 feet in diameter and 20 feet high.

The $12,900,000 in FY 1984 will be used to continue procurement of the accelerator and data acquisition components, assemble the accelerator and install the data acquisition system.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide an accelerator with increased power and energy capabilities to support the ICF Experimental Program. This phase of the Particle Beam Fusion Program is directed toward experiments on ignition scaling by heating and compressing pellets filled with deuterium-tritium (DT) fuel. The benefits that would be derived from the capability to perform DT fusion ignition scaling experiments with the PBFA-II would be principally in the area of studies for military applications, as well as fusion research directed at a potential long-range solution to U.S. energy needs.

The present program utilizes a pulsed power device called PBFA-I, which is capable of delivering up to one million joules of energy in a single 30-trillion-watt peak-power pulse. PBFA-II will provide approximately 3.5 million joules of energy in a 100-trillion-watt power pulse. The new high-bay laboratory building will house PBFA-II and all required support systems. PBFA-I will continue to operate in support of particle beam fusion research during construction of PBFA-II. PBFA-II will be based on power concentration technology, beam physics, target interaction studies, power conditioning, and reliability and performance data from investigations on existing accelerators, PBFA-I, and SUPERMITE.

Recent target design studies indicate that beam energies of approximately one-and-one-half-million joules and power levels of approximately 100 trillion watts will have to be coupled into the target to achieve the necessary conditions for pellet ignition. In addition, fusion power reactor systems studies show that pulse repetition rates of 1 to 10 pulses per second will be needed with high reliability and standoff distances of several meters between the beam injector and target. In order to satisfy the relevant criteria, several steps must be taken. Sandia has defined the critical steps and is pursuing a program which will permit one to address the questions sequentially. The next step planned for 1986 is to conduct experiments to obtain ignition scaling data to confirm theoretical predictions.

The long-term motivation for the large national commitment to fusion research is for an inexhaustible source of energy from fusion power. The more immediate application of inertial confinement research is to national security. PBFA-II will permit the increased capability in accelerator power and energy and provide additional lab space for assembly, maintenance, and pulse power technology development to carry out this research.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

10. Details of cost estimate a/

a. Inspection cost at 0.8% of construction		$ 190
b. Construction costs		12,610
(1) Improvements to land - roads, paved areas, fencing	$ 600	
(2) Buildings		
(a) High-bay laboratory, approximately 21,000 square feet at about $302 per square foot	6,360	
(b) Laboratory/office, approximately 13,000 square feet at about $136 per square foot	1,770	
(3) Utilities - electrical, water, sewer, telephone	700	
(4) Special utilities - oil and deionized water tanks, pumps, and filters	3,180	
c. Equipment - accelerator and instrumentation		23,500
Subtotal		36,300
d. Contingency at approximately 16% of above costs		5,850
Total project cost		$ 42,150 b/

11. Method of performance

Inspection will be on the basis of a negotiated fixed-fee contract placed on the basis of competency. Construction will be by lump-sum, fixed-price contract awarded by competitive bids. Sandia National Laboratories will procure and install the accelerator and instrumentation components.

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a/ Original project cost based on Title II design of the facilities and Title I design of PBFA-II.
b/ Excludes PE&D funding.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 4,457	$ 10,100	$ 3,076	$ 24,517	$ 42,150
(b) PE&D	2,500	0	0	0	2,500
(c) Inventories	100	150	0	0	250
Total facility costs	7,057	10,250	3,076	24,517	44,900
2. Other project funding					
(a) R&D necessary to complete construction	3,550	4,500	2,000	1,000	11,050
Total other project funding	3,550	4,500	2,000	1,000	11,050
Total project funding (items 1 & 2)	$ 10,607	$ 14,750	$ 5,076	$ 25,517	$ 55,950

b. Total related funding requirements (estimated life of project: 5 years)

1. Facility operating costs	$ 210
2. Programmatic operating expenses directly related to the facility	1,500
3. Capital equipment not related to construction, but related to the programmatic effort in the facility ...	250
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related funding requirements	$ 1,960

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility	
(a) Construction line item	$ 42,150
(b) PE&D funds	2,500
(c) Accelerator spare parts	250
2. Other project funding	
(a) R&D necessary to complete conceptual design was prepared by Sandia National Laboratories	50
(b) R&D funding to supplement Title II PE&D funds for the development of the accelerator	11,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

13. Narrative explanation of total project funding and other related funding requirements (contd.)

    b. Total related funding requirements

        1. Facility operating costs 210

            Utility, janitorial and maintenance costs estimated at approximately $5.00 per square foot annually.

        2. Programmatic operating expenses directly related to the facility 1,500

            Salaries and supplies for approximately 15 people per year

        3. Capital equipment not related to construction, but related to the programmatic effort in the facility ... 250

            An estimate of the equipment requirements to maintain the annual programmatic effort.
            No installations of new programmatic related capital equipment are anticipated.

	FY 1983 Appropriation	FY 1984 Request
Stockpile Evaluation	$ 139,500	$ 145,400

This subactivity provides the funding required to assure the high quality and reliability of nuclear weapons and components in the war reserve stockpile and those products to be delivered to the stockpile, and to continue that assurance through reliability assessments issued quarterly during the stockpile life of every nuclear weapon system.

The FY 1984 funding level will support the development, engineering, and production effort associated with testing new weapon systems planned for war reserve production during FY 1983 and beyond; will ensure the reliability and quality of the existing stockpile; and will accomplish the FY 1984 portion of the Stockpile Improvement Program.

	FY 1983 Appropriation	FY 1984 Request
Process Development	$ 79,600	$ 96,600

This subactivity is directed toward: (1) solving current problems and adequately supporting all current and planned production of new weapon components in Phase 3; (2) developing new processes aimed at improving operations by reducing process time and attrition of materials, improving process yields, and the implementation of computer-aided design/computer aided-manufacturing (CAD/CAM) technologies; and (3) developing process and production techniques required to support necessary advanced technologies and the use of new materials in order to provide for an efficient transition of new technologies and materials into Phase 3 development programs for future weapons as defined by the weapons design laboratories.

The increase of $17,000,000 over FY 1983 is required to support the increasing levels of new production and to support the heavy weaponization effort for all the weapon systems in engineering development.

	FY 1983 Appropriation	FY 1984 Request
Other Costs	$ 204,400	$ 241,615

This subactivity provides funding for those costs incurred in the weapons production complex that are not recognized as part of product costs. This funding includes: (1) nuclear materials recycle and recovery activities, (2) field engineering and training activities, (3) secure transportation activities, (4) facilities startup and standby activities, and (5) other miscellaneous activities including changes in inventory balances.

A significant portion ($129,620,000) of the total funds included in the Other Costs category is for nuclear material recycle and recovery activities conducted at Mound, Oak Ridge, Rocky Flats, and Savannah River weapon production facilities. Tritium is recovered at the Mound Facility, enriched uranium and oralloy are recovered at Oak Ridge, and plutonium is recovered at Rocky Flats. Savannah River purifies and enriches the special nuclear materials to design specifications. As a result of the increased production levels, it is anticipated that FY 1984 funding levels will increase over FY 1983 by $19,510,000.

Also included within this subactivity are field engineering, training, technical, and administrative services provided to the Department of Defense and Department of Energy weapon production plants. FY 1984 costs are estimated to be $4,450,000, an increase of $630,000 over FY 1983.

The secured transportation shipments of nuclear weapons, weapon components, and all "strategic" or "trigger" quantities of all Government-owned special nuclear materials are included in this subactivity. These costs include the salaries, fringe benefits, and travel expenses of Federal couriers along with the cost of contract air and rail shipments and the maintenance of Government-owned motor vehicles. FY 1984 costs are estimated to be $37,850,000--$5,465,000 over FY 1983. This increase is a direct result of the increase in overall production workloads.

Facilities startup and standby costs are anticipated to be $14,140,000 in FY 1984. This amounts to a $2,460,000 increase over FY 1983. The increase in this area is required to support Phase 1 and Phase 2 restoration efforts at the Y-12 Plant.

The Other Costs category also includes a $33,350,000 inventory change in FY 1984. This estimate is detailed in the following table:

	FY 1983 Appropriation	FY 1984 Request
Inventory Category		
Special Process Spares--LANL Phermex	$ 200	$ 240
Common Use Stores	6,360	6,970
Special Reactor Materials--Boron 10	12,240	14,740
Other Special Materials--Gold, Silver, and Platinum	6,100	11,400
Total	$24,900	$33,350

The increase in inventory change, $8,450,000, is required to support the overall increase in program activities.

The remaining $22,205,000 in the Other Costs category is also required to support the increasing production workload. Included in this area are the costs of Federal program management, the maintenance of management information systems (MIS), communications operations and maintenance, site planning, and management and planning studies as shown below:

	FY 1983 Appropriation	FY 1984 Request
Federal Program Management	$10,840	$12,900
MIS Maintenance	2,260	2,380
Communication Operations and Maintenance	1,070	1,190
Site Planning	1,360	600
Energy Management Studies	1,150	1,090
Planning and Management Studies	4,130	3,820
Other	695	225
Total	$21,505	$22,205

Federal Manpower Requirements

The FY 1984 request also includes a Federal personnel level of 689 full-time equivalents, an increase of 54 above the FY 1983 level of 635 full-time equivalents. This increase in Federal personnel levels is required to effectively monitor and manage a program that will increase by more than 30 percent over the next 5 years.

These Federal personnel are required at the following Department of Energy field operations offices:

	Full-Time Equivalents	
	FY 1983	FY 1984
Albuquerque Operations Office	597	648
Oak Ridge Operations Office	28	31
Savannah River Operations Office	10	10
Total Full-Time Equivalents	635	689

Major Computer Leases

The FY 1984 request includes $9,920,000 for the lease of the following major computer systems:

	FY 1983 Appropriation	FY 1984 Request
Bendix Plant, Kansas City, Missouri		
CAD/CAM Production System	$1,350	$ 2,000
General Purpose Computer	0	800
Rocky Flats Plant, Boulder, Colorado		
General Purpose Computer Replacement	1,500	375
CAD/CAM Expansion	0	1,200
Mound Facility, Miamisburg, Ohio		
Shop Floor Computer System	285	145
CAD/CAM Systems and Network	0	300
Pantex Plant, Amarillo, Texas		
CAD/CAM Interactive Graphics System	0	1,000
Pinellas Plant, St. Petersburg, Florida		
CAD/CAM Systems and Network	0	1,100
Oak Ridge, Y-12 Plant, Oak Ridge, Tennessee		
Central Computer Systems Replacement	500	1,400
CAD/CAM Systems and Network	0	1,600
Total	$3,635	$ 9,920

These computers are necessary to meet the production management, process control, and numerical control activities and for administrative information processing requirements at the plants.

	FY 1983 Appropriation	FY 1984 Request
CAPITAL EQUIPMENT	$ 92,000	$ 114,400

The estimate for FY 1984 will provide funding: (1) for acquisition of equipment to provide a minimum capability in the production complex to meet the heavy workload in the mid-1980's, (2) to provide for a minimum effort toward the continuing upgrading of safeguards and security capability, and (3) to arrest the continuing deterioration of equipment in the production complex. The FY 1984 funding request is comprised of $9,700,000 for the purchase of computers and $104,700,000 for the acquisition of basic equipment which includes $11,500,000 for safeguards-related transportation and communications equipment. The basic equipment funding request is required to halt the ongoing deterioration of equipment base and to acquire additional equipment in the production complex to meet expanding program requirements and to increase the effectiveness and efficiencies of existing operations.

	FY 1983 Appropriation	FY 1984 Request
Major Computer Equipment	$ 800	$ 9,700

The following table details the major computer items included for FY 1984:

	FY 1983 Appropriation	FY 1984 Request
Bendix Plant, Kansas City, Missouri		
Shop Floor Data Systems	$ 0	$ 1,200
Mound Facility, Miamisburg, Ohio		
CAD/CAM Systems and Network	0	2,300
Pantex Plant, Amarillo, Texas		
Data Collection System	800	0
Pinellas Plant, St. Petersburg, Florida		
CAD/CAM Systems and Network	0	3,550
Oak Ridge, Y-12 Plant, Oak Ridge, Tennessee		
CAD/CAM Systems and Network	0	2,650
Total	$ 800	$ 9,700

These computer acquisitions, along with the leases outlined in the operating expenses portion of the narrative, constitute the core of our efforts to accelerate the acquisition and utilization of CAD/CAM technology.

The Department of Energy is currently expanding the capacity of weapons production facilities. We are relying on computer-aided manufacturing to allow us to achieve this expansion in a cost-effective manner. The expected increases in labor productivity and product yields from CAD/CAM implementation reduces engineering and manufacturing direct and direct support labor. This translates to reduced operating costs and facility expansion. In addition, we are relying on CAD/CAM to negate the need for expansion of certain critical skills, such as tool designers, that are very difficult to obtain from the current labor market.

Bendix Plant - Shop Floor Data Systems $1,200

This item is comprised of two distributed processing computer systems, one to support plant-wide work in process reporting and the other to support production data recording in D/71 Micro-Miniature Electronic Assembly. Both systems will communicate with the General Purpose Computer System to exchange data required to interface with the higher level integrated plant systems, but they also will provide for unique collection and analysis of data required for improved shop floor management in each different department.

Gradual expansion of this concept to many individual plant departments appears to be a feasible and cost-effective approach to supporting the large number of input devices required to achieve workstation reporting while providing the flexibility to satisfy the specialized departmental needs for increasing efficiency. In addition to improved product tracking, substantial benefits will be realized in other automated systems related to inventory accounting and requirements planning. This approach will minimize impact of downtime of the central computing system; improve productivity and departmental efficiency; and provide improved levels of reliability, flexibility, and service to the factory floor.

The first distributed system planned for FY 1984 will expand the concept to additional departments and will continue a gradual upgrade of the existing Manufacturing Operations Status Entry System (MOSES). The MOSES system supports the needs of integrated systems for plantwide planning, scheduling, and control. The current system operates on the Bendix General Purpose Computer System and is supported by a network of approximately 150 cathode ray tubes located throughout the factory for real-time collection of manufacturing work in process data.

Mound Facility - CAD/CAM Systems and Network	$2,300

This item will provide the necessary equipment and facilities for Mound to establish and expand the technology base required to achieve an automated production environment during the late 1980's. Technologies which will be expanded or introduced include interactive graphics; flexible automation techniques, automated material transfer systems, and microprocessor controlled processes; and factory management systems including material resource planning, scheduling, group technology, and process planning. The functional areas addressed in this item are: design/drafting, facility design, product test design/documentation, product and process engineering, numerically controlled parts programming, shop automation, factory management, and quality control.

Pinellas Plant - CAD/CAM Systems and Network	$3,550

This item will provide for the expansion and establishment of CAD/CAM manufacturing capabilities within the Pinellas Plant. This investment is aimed at reducing product design and manufacturing leadtimes, reducing scrap and rework time, and reducing material inventory.

Y-12 Plant - CAD/CAM Systems and Network	$2,650

The new capabilities provided by this item will augment and complement existing interactive graphics capability at the Y-12 plant. The design and process capability afforded by this item will become an integral part of Y-12 production activities. The ability to use these aids to design tooling for processes now requiring many iterations of trial and error will result in benefits far beyond those from a reduction in designers' time alone. Interactive graphics systems have also demonstrated a high payoff in the engineering disciplines for facility design.

	FY 1983 Appropriation	FY 1984 Request
Basic Equipment	$ 91,200	$ 104,700

The increase of $13,500,000 in basic equipment funding in FY 1984 is comprised of an increase of $3,750,000 in safeguards-related transportation and communications equipment, and a $9,750,000 increase in other equipment items that are essential to halt the deterioration of the weapons production equipment base.

The transportation safeguards requirement totals $11,500,000 for FY 1984. It consists of $7,420,000 for 16 additional safe and secure trailers to handle the increased workload over the next five years, $1,100,000 for the upgrade of worn ATMX railcars, $2,420,000 to maintain an effective secure communication system, and $560,000 for the replacement of other operational equipment.

The remaining $93,200,000 of basic equipment funding is required to halt the deterioration of equipment throughout the nuclear weapons production complex. Three appraisals of the weapons production complex have been conducted to determine the magnitude of the equipment deterioration problem and these show a substantial accumulation of physically poor, technologically inadequate, and obsolete equipment. This condition was caused by the substantial underfunding of capital equipment in recent years. These appraisals also show that the condition of equipment in the weapons production complex continues to deteriorate because of the continued underfunding of capital equipment. The requested increase in funding will arrest the deterioration while efforts to restore poor and inadequate equipment and utilities continue. Without the additional funding for capital equipment, the utilities and equipment restoration effort will be delayed beyond the planned seven-year program. This will reduce the assurance that planned workloads and delivery commitments will be met and will increase the cost of the restoration effort.

	FY 1983 Appropriation	FY 1984 Request
CONSTRUCTION	$ 334,400	$ 443,200

Following is a table listing the construction items included in the FY 1984 production and surveillance budget. Detailed description and justification information for each project is presented in the construction project data sheets.

Project Number	Title	TEC	FY 1983 Appropriation	FY 1984 Request
New Projects				
84-D-111	General plant projects	$ 29,500	$ 0	$ 29,500
84-D-112	TRIDENT II warhead production facilities, VL	96,000	0	19,300
84-D-113	Antisubmarine warfare/standoff weapon warhead production facilities, VL	94,500	0	17,600
84-D-114	Consolidated nonnuclear manufacturing facility, RF	46,800	0	24,100
84-D-115	Electrical system expansion, Pantex	15,000	0	1,500
84-D-117	Inert assembly and test facility, Pantex	13,600	0	1,500
84-D-118	High explosive subassembly facility, Pantex	60,000	0	7,000
84-D-119	Railroad track replacement and upgrade, Pantex	7,800	0	800
84-D-120	Explosive component test facility, Mound	21,900	0	13,100
84-D-121	Safeguards and site security upgrade, RF	22,000	0	10,000
	Total new projects		$ 0	$124,400

Project Number	Title	TEC	FY 1983 Appropriation	FY 1984 Request
Prior-Year Projects				
83-D-123	General plant projects	$ 16,300	$ 16,300	$ 0
83-D-124	Standard Missile-2 (SM-2) warhead production facilities, VL	10,000	2,000 a/	3,000
83-D-134	SENTRY warhead production facilities, VL	72,000	0 a/	16,300
82-D-106	Weapons assembly facilities, Pantex	40,000	16,500	0
82-D-107	Utilities and equipment restoration, replacement, and upgrade, Phase 3, VL ...	825,000	154,400 a/	229,200
82-D-108	Nuclear weapons stockpile improvement, VL	52,300	33,300 a/	4,000
82-D-109	155mm Artillery fired atomic projectile (AFAP) production facilities, VL	65,000	0 a/	2,500
82-D-111	Interactive graphics system, VL	30,600	6,000 a/	18,600
82-D-146	Weapons production and production support facilities, VL	72,200	40,000 a/	14,200
81-D-115	Missile X warhead production facilities, VL	125,000	60,000	30,000
81-D-120	Control of effluents and pollutants, Y-12	6,400	0	1,000
78-16-a	Cruise missile production facilities, VL	98,800	16,000	0
78-17-d	Steam plant improvements, Y-12	27,000	6,000	0
	Total prior-year projects		350,500	318,800
General Reduction			-16,100	-
	Total Production & Surveillance		$334,400	$443,200

The requested level is comprised of $89,600,000 to continue and complete prior-year construction projects, $258,700,000 to restore and maintain aging facilities, $36,900,000 to initiate construction to support the Nuclear Weapons Stockpile Memorandum, $48,000,000 to initiate construction of production support facilities to support the long-term workload increases, and $10,000,000 for safeguards and security upgrades.

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a/ Based on the Further Continuing Appropriation Act, 1983 (Public Law 97-377), project cost estimates, funding requirements, and schedules may require adjustments.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $29,500
Date: 1/83

7. Financial schedule

		Costs			
Fiscal Year	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior to FY 1982	$ 0	$ 8,260	$ 4,100	$ 2,515	$ 0
1982	11,300	2,300	3,900	3,900	1,200
1983	16,300	0	3,300	5,700	7,300
1984	29,500	0	0	5,900	23,600

8. Brief physical description of project

This project provides for general plant improvements involving minor new construction in the weapons production complex. The work to be performed will include such activities as construction of roads, utilities, minor structures, capital alterations and additions, and technical facilities required for the operation of weapons program installations.

A project of this type cannot be detailed in advance. The subprojects listed below are examples of items under consideration. In general, the estimated funding for each location and listed subprojects is preliminary in nature and primarily indicative of the size of the subproject and the relative magnitude of the requirements. It should be noted also that the continuing study of requirements will result in changes in scope of some of the subprojects. Other subprojects will be added with the necessary postponement of some of those now included, dependent upon conditions or situations not now apparent.

This project covers requirements of the weapons production complex, the Albuquerque Operations Office and its operating contractors, the Y-12 Plant (under the Oak Ridge Operations Office), and the Y-12 operating contractors.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project

A general plant project is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction. Research developments and changes in technical program requirements frequently result in the need for altered or new construction items not previously anticipated. In the past, these changes have included additions to buildings to house new equipment for weapons production support functions; construction of new small buildings; extensions or modifications to utilities; and general area development.

The weapons production and surveillance general plant project estimate for FY 1984 of $29,500,000 provides the minimum level of effort essential to meet the existing programmatic requirements, requirements for maintenance and replacement due to the aging of the plants, and other capital facilities.

The following subprojects are examples of items of work which may be performed at the major locations covered under this project. These are grouped by location and under the following reason-of-need categories: (1) Health, Fire, and Safety; (2) Programmatic Needs; (3) Pollution Abatement; and (4) Other.

The preliminary estimate of FY 1984 requirements by major area is as follows:

Albuquerque Operations Office	$24,800
Oak Ridge Operations Office	4,700
Total	$29,500

Albuquerque Operations Office - Weapons Production Complex $24,800

(1) Health, Fire, and Safety

a. Upgrade Boilerhouse Lighting, Bendix Plant .... $ 100

Approximately 137 existing incandescent lights including conduit and wiring will be replaced with 61 high-pressure sodium-type lighting fixtures and new wiring. Existing illumination is inadequate and wiring does not meet code requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

b. Personnel Accountability System, Pinellas Plant .... $ 380

Computerized badge scanning equipment will be installed at building entry points to account for personnel in the event of a plant evacuation. DOE recommends personnel accountability with an accuracy of 99 percent within 30 minutes.

c. Upgrade Waste Volume Reduction Facility, Rocky Flats Plant .... $ 270

Ventilation system improvements and nuclear safety improvements to drains and tanks will be made to eliminate further need for temporary measures, such as plastic houses around equipment, to contain radionuclides and to protect the environment.

d. Overhead Steam Line Work Platforms, Rocky Flats Plant .... $ 170

Five work platforms will be built at existing valve stations on overhead steam lines. Operation and maintenance currently requires use of ladders or portable scaffolds.

e. Liquid Fluorine Handling System, Rocky Flats Plant .... $ 120

A 1,000-pound dewar, a concrete pad, a garage, an exhaust system, and monitoring equipment will be installed to eliminate the use of small cylinders to contain fluorine. Cracked cylinder valve bodies have been discovered before accidents have happened. The new system will avoid approximately 800 cylinder changes each year.

Subtotal - Health, Fire, and Safety ... $1,040

(2) Programmatic Needs

a. Hermetic Sealing Assembly Area, Bendix Plant .... $ 950

Existing buildings will be modified to establish a 3,200-square-foot area for hermetic sealing facilities. Approximately 2,600 square feet of the area will have humidity controlled to 10 percent and will have conductive, grounded flooring. More hermetically sealed components are being requested to meet extended stockpile life and nuclear safety requirements. Existing facilities do not have the capacity to handle the projected workload.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

b. Upgrade Standards and Gage Laboratory, Pinellas Plant .... $ 460

A new, upgraded laboratory will be constructed and will include a separate area with an air-conditioning system controlled to ±1°F for precision measuring instruments. The improved laboratory is neeeded to insure the accuracy of instruments, gages, and testers used in production and inspection of plant products.

c. Test Firing Facility, Pantex Plant .... $ 500

An 850-square-foot building addition will be built to accommodate two new high-explosive firing chambers. This will provide needed capacity and capability for the support of design agency, high explosive testing, and development requirements.

d. High-Explosive Powder Manufacturing Facility, Mound Facility .... $ 840

A 2-story concrete block building addition of about 3,600 square feet will be built and equipped for high explosive powder production. This will provide additional capacity required by increasing demand for this powder manufactured at Mound and will reduce the amount of rejected products by improving cleanliness controls.

e. Americium Storage Area, Rocky Flats .... $ 430

An existing americium tank vault will be modified to provide a storage area for concentrated americium oxide. An interim storage area is needed to temporarily store americium oxide with adequate protection of personnel and the environment until a national storage or disposal site is established.

f. Upgrade Foam Molding Area, Bendix Plant .... $ 950

Approximately 14,000 square feet of the existing foam molding facility will be rearranged and upgraded and 1,000 square feet will be added. Construction will include new walls, floor covering, ceiling exhaust systems, heating, ventilating, and air-conditioning systems and relocation of equipment. Tighter tolerances and more complex configurations in molded foam products requires upgrading of the existing facility, improving fume exhausts, and expanding overloaded capabilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations
2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

g. Model Shop Expansion, Pinellas Plant .... $ 950

A 3,500-square-foot building addition and two pieces of numerically controlled machining equipment will comprise this project. An expanded engineering model shop is required to eliminate interruptions in the production machine shop caused by urgent needs for special machining and rapid turnaround times. The expansion will relieve the production machine shop of an estimated annual 6 man-year machining workload.

h. Environmental Control for Pelleting Bay, Pantex Plant .... $ 200

Partitioning and environmental control equipment will be installed in the development high-explosive pellet processing area to maintain the area temperature of 68°F ± 2°F and the relative humidity at 15 percent. This improvement in environmental conditioning will eliminate forced shutdowns caused by high humidity and will permit improvements in the product quality.

i. Building Addition, Mound Facility .... $ 840

A 2,140-square-foot, brick-faced, concrete block building addition will be built on the second floor of an existing building. This space is required for projected increases in machine shop staff.

j. Additional Standards Laboratory, Rocky Flats Plant .... $ 400

A prefabricated 800-square-foot laboratory space with self-contained temperature and humidity controls will be installed to meet increasing workload in recertification of tools, gages, and fixtures by the standards laboratory staff.

k. Automated Assembly Facility, Bendix Plant.. $ 650

A new manufacturing capability for manufacturing printed wiring assemblies using standardized processes and automated equipment will be established with the existing building. This facility will be used initially for developmental processes and will later be converted to production of certified war reserve components.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

l. Quality Control Capability Study Room, Pinellas Plant .... $ 170

The capability study room in the existing building will be expanded to accomodate additional equipment and inspection personnel required to enhance overall productivity.

m. Storage Expansion, Pinellas Plant .... $ 280

This project will provide racks, shelves, desk and record space, and material handling aides in an existing secured area. A centralized area for shelf life and other products held for experimentation will be provided. A 50 percent increase (1,200 square feet) in storage capacity is required to hold present and future products for shelf life testing programs.

n. Small Component Firing Facility, Pantex Plant .... $ 900

Approximately 2,500 square feet of new floor space will be built for the installation of a 2-pound, high-explosive test firing chamber. Construction will include a darkroom, camera rooms for high-speed streak and framing cameras, and an equipment room for electronic diagnostic and control equipment. This facility will provide needed capacity for qualification testing of explosive components.

o. Upgrade Standards and Calibration Facility, Mound Facility .... $ 850

A 2,500-square-foot, brick-faced, concrete block building addition will be built and provided with equipment for computerized automation of inspection and calibration equipment. This project will permit consolidation of computerized calibration and standards equipment which is currently operated in at least eight scattered areas, including a stairwell.

p. Storage Area, Rocky Flats .... $ 250

A 3,000-square-foot addition will be built on an existing building to provide storage for packaging materials and a 3-day output of packaged salt. This facility will meet environmental, safety, and health requirements. This project would relieve congestion and reduce the fire hazard in the existing building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

q. Upgrade Encapsulation Department, Bendix Plant .... $ 400

This project will rearrange and upgrade approximately 5,500 square feet of production space in the electrical assembly encapsulation department. Equipment will be relocated, antistatic flooring will be installed, and walls and ceilings will be refurbished. This upgrade is needed to increase production efficiency and to meet increasingly stringent quality requirements.

r. Expand Thermal Battery Facilities, Pinellas Plant .... $ 210

An additional 1,000 square feet of floorspace will be built to provide workspace for new development assignments.

s. Flammable Storage, Pantex Plant .... $ 100

New floorspace will be built in the vicinity of the plastics shop for storage of flammable liquids. This storage will promote efficiency in supplying flammable liquids to the plastics operations.

t. Explosive Storage Magazines, Mound Facility .... $ 330

Two standard bunker-type explosive storage magazines, approximately 120 square feet each, will be built for segregating different pyrotechnics and explosive powders which are prohibited from mixed storage. No storage magazine is available for certain explosive materials which are currently being stored in operating laboratories.

u. Liquid Nitrogen Piping System, Rocky Flats Plant .... $ 170

A new cryogenic piping system will be installed to deliver liquid nitrogen from an existing nitrogen supply dewar outside the production building. This will eliminate the use of smaller dewars, eliminate liquid nitrogen handling time, and reduce safety problems.

v. Office Addition, Rocky Flats Plant .... $ 910

Additional office space will be obtained by adding a second floor of approximately 10,000 square feet to an existing solvent extraction building. Available office space is inadequate to support the projected workload in this building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

w. Office Addition, Rocky Flats Plant .... $ 950

A 9,000-square-foot building addition will be built to permit relocation of office personnel from existing laboratory space needed for plutonium and nonplutonium work. Maintaining offices in a plutonium area is not cost effective and has been of concern to health physics.

x. Containment Hoods, Pantex Plant .... $ 300

Special steel laboratory hoods will be procured and installed in the sample preparation area of the weapons material analytical laboratory. These hoods are required to prepare high-explosive samples greater than 5 grams in weight for testing.

y. Tritium Removal and Calibration Laboratory, Mound Facility .... $ 300

Two special laboratory hoods for tritium work and associated laboratory equipment will be installed in an existing facility. This additional capability is needed for engineering evaluation of processes equipment and materials to be used in improving control of tritium and in reducing tritium releases to the environment.

z. Process Waste Water Storage Tank, Rocky Flats .... $ 600

A new tank will provide approximately 1.2 million gallons of process waste water storage. Waste water currently is being stored in solar evaporation ponds. The new tank will facilitate achievement of a plant goal to eliminate the use of ponds.

aa. Process Development Facility, Rocky Flats .... $ 200

A research facility will be built for use in developing photoresist process techniques for application on future weapons systems. A temporary facility was established in the organic coatings laboratory for development of processes to be used on the W79 program. A larger, permanent facility is required to support future systems.

9. Purpose, justification of need for, and scope of project (contd.)

bb. ADP Facility Security, Rocky Flats Plant .... $ 280

This project will provide security measures for an existing data acquisition system control room and computer storage vault inside the new plutonium recovery and waste processing building. Construction will provide physical security measures for personnel, communications, and ADP hardware and software.

cc. Hot Press Facility, Rocky Flats Plant .... $ 950

A new hot isostatic press will be procured and installed in a separate facility. This new capability would be used in development of the beryllium technology program. It will improve mechanical properties of the material and reduce substantially the amount of powdered metals used by pressing metals to near-net shape.

dd. Office Addition, Rocky Flats Plant .... $ 900

Additional office space will be built at Rocky Flats Plant to support future production requirements, including training and certification of personnel and will provide an area for employee work breaks. Additional office space, conference space, break areas, and training space is required to meet near-term production commitments.

ee. Building Addition, Rocky Flats Plant .... $ 460

A 4,400-square-foot addition will be built on the remote engineering facility to support development of automating and remoting activities. Additional space is needed for development of equipment and procedures to reduce radiation exposure and to increase operational safety and productivitiy.

Subtotal - Programmatic Needs $16,680

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

(3) Other

a. Replace Air-Conditioning Units, Bendix Plant .... $ 800

Twelve air-conditioning units will be replaced. These will have been in service 20 or more years by the time they are replaced and are substantially deteriorated. Funding is planned for FY 1985 replacement to prevent further growth in the backlog of poor and inadequate facilities which require restoration.

b. Utilities Restoration, Bendix Plant .... $ 460

Replacement is scheduled for FY 1985 for floor duct wiring in office areas, acid and caustic pumps in production areas, and hot water heat exchangers in a boilerhouse. These replacements are required to insure continued reliable utilities services to the manufacturing and support operations. This subproject is planned to reduce the growth of poor and inadequate facilities which require restoration.

c. Air Handler Replacement, Pinellas Plant .... $ 500

Fifteen poor and inadequate air handlers will be replaced in FY 1984 using restoration project funding. This project will implement a 10-year plan to replace air handling units as they reach the end of their useful lives. This will avoid production interruptions and prevent growth in the restoration backlog.

d. Crafts Storage Shed, Pantex Plant .... $ 370

A 2,000-square-foot building with paved approach for storage of raw materials and tool staging. This building is needed to support operation of the tool and die shop and the boiler shop.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

e. Building Addition, Mound Facility .... $ 540

A 2,600-square-foot, brick-faced, concrete block addition will be built on the printing services building for storage of classified printing orders. This addition has been necessitated by increases in printing requirements and installation of new equipment. The project also involves the relocation of a nearby warehouse function, which stores paper for the printing plant. The printing plant operations will require several days' supply of paper to be stored at the printing plant.

f. Motion Detection System, Rocky Flats .... $ 340

New motion detection systems with alarms will be installed in vaults or vault-type rooms which are used for storage of special nuclear material. These detection and alarm systems will transmit immediate warnings to the plant protection central station.

g. Roof Ramps and Walkways, Bendix Plant .... $ 850

Approximately 1,500 feet of 5-foot-wide steel ramps and walkways will be installed on the Bendix Plant roof to provide maintenance and repair access to heating, ventilating, and air-conditioning equipment; exhaust fans; dust collectors; and transformers. This construction will expedite maintenance and repair activities and will more than double the life expectancy of the roofing. The roofing materials are damaged by foot traffic and by transporting equipment and materials associated with service and repair.

h. Water Treatment Facility, Pinellas Plant .... $ 400

A facility will be built for treating ground water and runoff water collected in a pond on the plant site. The facility will supply treated water to existing cooling towers. Water shortages and concern about water table decline has reached serious proportions in Florida, particularly in Pinellas County. This project will become a significant water conservation measure.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

i. Harden Security Guard Post, Pinellas Plant .... $ 190

A hardened security guard post will be located at the existing thermoelectric facility. A hardened security guard post is required for protection of special nuclear materials in accordance with DOE policy.

j. Guard Stations, Pantex Plant .... $ 90

Two masonry structures, each approximately 200 square feet in area, will be built at the entrance gates to control vehicle and personnel access to the plant.

k. Road Modifications, Mound Facility .... $ 220

The road between the administration building and the building where the purchasing department is located will be provided with storm drainage improvements, catch basins, curbing changes, and a parking lot. Lack of adequate drainage permits water to be trapped beneath the surface of the road which results in frequent and extensive damage repairs to the road.

l. Parking Lot Expansion, Pinellas Plant .... $ 610

Significant personnel increases and current building expansion plans require the addition of approximately 15,000 square yards of parking area.

m. Equipment Facility, Pantex Plant .... $ 100

A material handling equipment building will be built for material handling personnel and equipment. The building will provide for forklift battery recharge, equipment garaging, and some personnel support functions. The facility will improve operating efficiency, particularly during the winter months.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

n. Upgrade Road, Mound Facility .... $ 500

An existing deteriorated road surface will be replaced by a new surface. A drainage system consisting of curbing, catch basins, and an emergency spill basin will be built near the existing waste disposal building. Lack of proper drainage control has permitted erosion and deterioration of the road where trucks, buses, and liquid waste transfer vehicles are regularly operated.

o. Steam Line, Rocky Flats Plant .... $ 580

A new steam supply line will be built to augment heating in buildings where their existing boilers do not have the capacity to handle all heating requirements in cold weather.

p. Building Addition, Rocky Flats Plant .... $ 360

A single-story building addition will be built on the fire station to serve as permanent housing for female firefighters. This will replace temporary housing (a trailer) and provide a permanent facility to meet the Equal Employment Opportunity standards for female fire fighters.

q. Reroute Steam Lines, Rocky Flats Plant .... $ 170

Old, uninsulated, underground steam and condensate lines to two buildings will be replaced with insulated overhead lines rerouted with existing overhead lines from a nearby building.

Subtotal - Other .... $ 7,080

Oak Ridge Operations Office, Y-12 Plant .... $ 4,700

(1) Health, Fire, and Safety

a. Contamination Control Station, Y-12 Plant .... $ 200

A contamination control station will be built to provide radioactivity monitoring counters, seating, and storage for personal shoes. New monitoring capability is needed to assure that contaminated personal shoes do not leave the plant.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

b. Traffic Control System, Y-12 Plant .... $ 340

A 40-year-old traffic control system for the access road to the Y-12 Plant often fails during shift change and creates a serious safety hazard. A new electronic traffic control system will be installed.

c. Laboratory Upgrade, Y-12 Plant .... $ 210

An existing health physics equipment calibration laboratory will be upgraded to assure that the instruments and devices used to measure ionizing radiation are adequately calibrated. Stricter requirements are being imposed on personnel monitoring and contamination control measures.

Subtotal - Health, Fire, and Safety ... $ 750

(2) Programmatic Needs

a. Quality Evaluation Offices .... $ 230

Approximately 2,400 square feet of office space will be built in the existing quality evaluation laboratory. Expansion of the quality evaluation laboratory is necessary to accommodate an increasing workload.

b. Expand Plating Laboratory .... $ 350

An 1,800-square-foot area will be modified in an existing building including improvement of the ventilation system to provide better temperature and humidity control and to control dust. Ion plating process development space is inadequate. Improvements are needed to accommodate increased workload requirements. Failure to provide the improvements will affect development of processes for current and future weapons programs.

c. Low-Level Radiation Laboratory .... $ 900

A new low-level laboratory is needed for radiation analysis required in the daily operation of the Y-12 Plant. The existing 2,000-square-foot facility is too small for the current workload capacity and too near sources of uranium and thorium contamination. In order to achieve the desired analytical dependability and capacity, a new facility will be built inside an existing building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

d. Upgrade Changehouse .... $ 600

As part of a continuing schedule to upgrade changehouses in the production area, a 25-year-old changehouse will be modified to provide additional space, lockers for personal clothing, clothes bins for work clothing, showers, and a shoe change room. These improvements will meet current standards for changehouses.

e. Space Suit Change Room .... $ 500

A new 1,680-square-foot environmental "space suit" change facility will be built in an existing building. The existing change facility poses a safeguards monitoring problem because it is outside the safeguards area. This construction will improve "space suit" changing efficiency and will release needed office space which is currently lost to supporting safeguards problems.

Subtotal - Programmatic Needs .... $ 2,580

(3) Pollution Abatement

a. Oil Reclamation Facility Expansion .... $ 100

An existing oil reclamation facility will be expanded to increase capacity and capability. New storage tanks, larger circulating pumps, larger particulate filters, larger molecular sieves, and a new centrifuge will be installed. A concrete loading and storage pad will be built. Additional petroleum resources will be conserved and oil disposal problems will be reduced.

Subtotal - Pollution Abatement .... $ 100

(4) Other

a. Utility Renovation .... $ 700

This subproject will replace, renovate, or refurbish deteriorating utility systems including such projects as replacement of major components of building heating, ventilating, air-conditioning systems; replacement of zone reheat systems where repairs are becoming increasingly difficult; and providing a waste holding basin for the steam plant and demineralizer. This project will help to reduce the growth of poor and inadequate facilities which require extensive restoration.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

9. Purpose, justification of need for, and scope of project (contd.)

b. Equipment Storage Shed .... $ 230

A 5,000-square-foot dry storage shed will be built with provision for access for mobile moving and handling equipment. An equipment storage shed is needed for spare transformers, portable generators, and high-voltage spare parts which are currently stored outside where sun, rain, and snow causes deterioration.

c. Ventilation Improvements .... $ 100

Improvements to the ventilation and air-conditioning system supplying the east end of the operating area will be made to correct inadequate working conditions. Temperatures in excess of 100°F occur in the area during the summer months. Improved ventilation will include cooling coils and associated piping and wiring.

d. Water Plant Maintenance Requirements .... $ 240

Modifications will be made to the water plant's reservoir twin tank, a salt storage building will be built, and a bulk fueling facility will be built. These activities are required to provide maintenance for the water treatment plant.

Subtotal - Other .... $ 1,270

10. Details of cost estimate

a. Engineering, design, and inspection	$29,500
b. Land and land rights	
c. Construction costs	
d. Contingencies	
Total estimated cost	$29,500

11. Method of performance

To the extent feasible, design and inspection will be performed under negotiated lump-sum architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. In some instances, it will be more economical or timely for design, inspection, procurement, or construction to be done by operating contractors and others already under contract to the Government.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 84-D-111

12. Pending schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1985

4. Date construction ends: 2nd Qtr. FY 1988

5. Previous cost estimate: None
Date:

6. Current cost estimate: $96,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$19,300	$19,300	$19,300	$ 8,400
1985	57,700	57,700	57,700	36,000
1986	15,600	15,600	15,600	37,000
1987	3,400	3,400	3,400	13,300
1988	0	0	0	1,300

8. Brief physical description of project

This project provides additional production capacity and capability required to support production of the TRIDENT II warhead. New facilities to be provided by this project include: equipment; building additions; renovation of some existing structures to adapt them for use in TRIDENT II production activities; and special facilities needed for production, certification, and assembly of components and complete warheads.

At the Y-12 Plant, this project will provide new computer control stations for a new cleaning and packaging facility for metal strips, a 200-ton press with furnace and power supply, a 50-ton press, an inert atmosphere enclosure, a conveyor, and handling gear. This project will provide approximately 10,000 square feet of new office space at the Y-12 Plant and approximately 2,000 square feet of building modifications for inspection equipment. Additional equipment to be provided include numerically controlled lathes, a 3-axis milling machine, a Cartesian coordinate measuring machine, a defractometer, sample preparation equipment, and other equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

8. Brief physical description of project (contd.)

At the Savannah River Plant, existing facilities will be modified to provide additional production capability and capacity.

The Rocky Flats Plant will require minor renovations to existing buildings and provision of production equipment to handle the workload associated with the TRIDENT II warhead.

Construction at the Bendix Plant will include a 4,000-square-foot expansion in the Miniature Radar Assembly Facility. This will involve construction of walls, modifications to the existing heating, ventilating, and air-conditioning system and provision of environmental controls to control relative humidity and temperature conditions. Rearrangement of the Electrical and Special Firing System Assembly Facility will include adding 1,900 square feet of floorspace for testing and encapsulation equipment. The space will be acquired from an adjacent manufacturing area. Similar environmental controls will be provided for the space addition. A new printed wiring production facility will be established in existing building space. Additional equipment to be provided includes a spectrum analyzer, radio frequency generators, continuous wave calibration system, calibration power measurement and attenuation measurement systems for radio frequencies, and a spin forming machine. Miscellaneous items of standard equipment will include microscopes, clean benches, storage racks, and related small items needed to support production and inspection.

Requirements at the Mound Facility for production of TRIDENT II warhead components include a building addition, special facilities for production and certifying components, plus additional equipment. A new 8,000-square-foot building will be built to house a new technology for detonator production in a clean room environment. A timer fabrication area will be renovated to incorporate clean room facilities. The new manufacturing technology and supporting auxillary operations requirements includes high-explosive material characterization and detonator testing equipment. A remotely operated high-explosive disassembly lathe with TV monitoring, a high-explosive incinerator, a laser welder, a 100,000 psi pressurization system, a glue bonding digital readout and data processor, and miscellaneous monitoring equipment will be provided. Major equipment will include a computer-controlled machining center, a turning center, surface grinder, a laser measurement system, and an electrical discharge machining center.

At the Pinellas Plant, this project will provide a 10,000-square-foot addition to the main manufacturing building. Additional TRIDENT II warhead production equipment to be provided by this project and installed in the building addition includes a vacuum furnace, silk screen printer, sintering furnace, and calibration and testing equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

8. Brief physical description of project (contd.)

The Pantex Plant will be provided with standard equipment needed for production support for the TRIDENT II warhead. An accelerated aging test unit will be built which will include a temperature chamber with sampling and recording equipment. Pressure and humidity measurement devices and temperature programmers will be installed to support materials compatibility testing. A mass spectrometer will be provided to analyze gas from weapon samples to aid determinations on material compatibility.

The requested FY 1984 funding will be used for project design and for long-lead equipment procurement.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity to meet established requirements for the TRIDENT II warhead.

Maximum use will be made of existing capacities and capabilities in preparing for production of the TRIDENT II warhead. Unique features of this warhead will require capabilities not currently available in the production plants. The facilities to be provided by this project are required to produce the warhead.

Substantial effort on this project must begin in FY 1984 to meet the necessary delivery dates. Procurement times for long-lead production equipment, materials, and components are currently requiring 30 to 36 months. In order to meet the established schedule, obligations of $19,300,000 will be required in FY 1984.

The cost estimate is based on preliminary warhead design information and limited conceptual design. The cost estimate includes an uncertainty allowance of $34,900,000 to cover process unknowns associated with potential warhead design alternatives.

10. Details of cost estimate a/

	Total cost
a. Engineering, design, and inspection at approximately 15% of construction and process uncertainties	$ 8,000
b. Construction costs and special facilities	21,200
c. Standard equipment, including procurement and installation	24,100
Subtotal	53,300
d. Contingency at 15% of above costs	7,800
e. Design and process uncertainties	34,900
Total estimated cost	$96,000

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a/ Estimate based on preliminary warhead design information and limited conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations
2. Project No.: 84-D-112

10. Details of cost estimate (contd.)

Estimates by location are as follows:

Y-12 Plant, Oak Ridge, Tennessee	$25,300
Rocky Flats Plant, Golden, Colorado	11,200
Bendix Plant, Kansas City, Missouri	6,800
Mound Facility, Miamisburg, Ohio	5,700
Pinellas Plant, St. Petersburg, Florida	5,100
Savannah River Plant, Aiken, South Carolina	5,000
Pantex Plant, Amarillo, Texas	2,000
Uncertainties	34,900
Total	$96,000

11. Method of performance

Design and inspection will be performed primarily by the operating contractors and, where feasible, under negotiated architect-engineer contracts. Equipment procurement, inspection, and installation will be performed by operating contractors.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 0	$ 8,400	$36,000	$37,000	$13,300	$ 1,300	$96,000
Total facility costs	0	8,400	36,000	37,000	13,300	1,300	96,000
2. Other project funding							
(a) Conceptual design	90	0	0	0	0	0	90
Total other project funding	90	0	0	0	0	0	90
Total project funding (items 1 and 2)	$ 90	$ 8,400	$36,000	$37,000	$13,300	$ 1,300	$96,090 a/

a/ This total includes $90,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

12. Pending schedule of project funding and other related funding requirements (contd.)

b. Other related funding requirements (estimated life of project: 10 years)

1. Facility operating costs	$ 2,500
2. Programmatic operating expenses directly related to the facility	6,500
Total other related funding requirements	$ 9,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design costs of about $90,000 will be incurred through FY 1984 in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be at least 10 years.

1. Facility operating costs include utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses include direct labor, materials and supplies, procurement and fabrication of tooling, and overhead.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988 a/

5. Previous cost estimate: None
Date:

6. Current cost estimate: $94,500 a/
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$17,600	$17,600	$17,600	$ 3,000
1985	46,500	46,500	46,500	32,300
1986	30,400	30,400	30,400	37,500
1987	0	0	0	15,500
1988	0	0	0	6,200

8. Brief physical description of project

This project provides additional production capacity and capability required by the weapons production complex to produce nuclear warheads for the antisubmarine weapon/standoff weapon (ASW/SOW) program. New facilities to be built within six of the weapons production plants will consist primarily of specialized equipment and facilities needed to build weapon components. Following are descriptions of new construction to be provided at each site.

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a/ This completion schedule and cost estimate rely upon the availability of facilities currently scheduled to be funded under Projects 81-D-115, MX Warhead Production Facilities, Various Locations, and 82-D-109, 155mm Artillery Fired Atomic Projectile (AFAP) Production Facilities, Various Locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine weapon/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

8. Brief physical description of project (contd.)

At the Kansas City Plant construction of additional production facilities will be done inside the existing main manufacturing building. An enclosed room will be isolated from general plant traffic and equipped as a test facility. A control room will be built and equipped with monitoring apparatus and space for test sample preparation. Standard equipment to be procured and installed at the Kansas City Plant includes five tracer lathes, a hot spin forming machine, and a coordinate measuring machine.

At the Pinellas Plant, a 10,000-square-foot addition to the main building will be built to provide space for ASW/SOW production facilities which will include space for vacuum storage for tubes, resin dispenser, and laser marking. A numerically controlled lathe and mill will be procured and installed in addition to miscellaneous inspection and production equipment.

At the Pantex Plant, available building space will be modified for special facilities and new equipment needed for ASW/SOW production. An accelerated aging unit and testing system will involve construction of a test chamber and associated sampling and recording equipment such as glass racks, pressure and humidity measurement devices, and temperature programmers. Additional calibration, analytical, and certification equipment will be provided for use in the standards laboratory material testing laboratory, test fire, and process inspection activities. Additional process equipment will be provided for pressing, machining, subassembly and final assembly work. A surface area analyzer will be provided for use in acceptance inspection for high-explosive materials.

At the Mound Facility, this project will provide and install additional equipment needed to develop, build, and test material and components for the ASW/SOW program.

Production of detonators and command disable explosive component production specifications will require an expanded high-explosive loading area, additional cleaning facilities, and a laser welder. Specialized gages will be provided for inspection of high-explosive assemblies.

Additional quality control equipment including a scanning electron microscope, an infrared microspectrophotometer, and an x-ray fluorescence detection system will be provided for quality control of high-explosive.

At the Rocky Flats Plant, existing production space will be modified to accommodate new production equipment needed for fabrication of ASW/SOW component parts. A significant amount of inspection, calibration, and analytical equipment will be required including an emission spectrograph and six spectrometers. Additional production equipment will include two numerically controlled lathes, three coordinate measuring machines, and a laser welder.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine weapon/standoff weapon warhead production facilities, various locations
2. Project No.: 84-D-113

8. Brief physical description of project (contd.)

At the Y-12 Plant, Oak Ridge, Tennessee, this project will provide new capability and additional capacity for production and certification of ASW/SOW components and subassemblies. Space for a product certification activity will be provided by modifying about 1,000 square feet of an existing building. Items of major equipment to be provided include quench and aging ovens, a casting furnace and mold quench system, bonding and pressing stands for component assembly, a weld station and weld positioner, adhesive mix station, a Cartesian coordinate measuring machine, and other equipment.

The FY 1984 funding requested will initiate design and procurement of long-lead equipment.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity to meet established warhead requirements for the ASW/SOW.

Maximum use will be made of existing capacities and capabilities in preparing for production of the ASW/SOW warhead. Unique features of the weapon will require capabilities not currently available in the production plants. The additional number of parts added to the production workload will require additional capacity at the production plants. The facilities to be provided by this project are required to produce the ASW/SOW warhead.

Construction of this project must begin in FY 1984 to meet the necessary weapon delivery dates. Procurement times for long-lead production equipment, materials, and components are currently requiring 30 to 36 months. In order to meet the established production schedule, obligations of $17,600,000 will be required in FY 1984.

The cost estimate for this project includes an uncertainty allowance of $23,300,000 to cover process unknowns associated with possible warhead design alternatives. Not included in this cost estimate is the cost of facilities which are currently scheduled for funding under Project 81-D-115, MX Warhead Production Facilities and Project 82-D-109, 155mm Artillery Fired Atomic Projectile (AFAP) Production Facilities. Production of the ASW/SOW warhead is planned to make joint use of these facilities concurrent with production of the MX and 155mm AFAP warheads. The cost of this project could increase by approximately $24,000,000, if financial support for these production facilities is not provided by the MX and 155mm AFAP programs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine weapon/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 11% of construction costs, item b		$ 6,260
b. Construction costs		55,620
(1) Building additions and modification of existing buildings	$ 6,320	
(2) Special facilities, including installation of production equipment and processing systems	49,300	
Subtotal		61,880
c. Contingency at approximately 15% of above costs		9,320
d. Design and process uncertainties		23,300
Total estimated cost		$94,500

The estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 7,300
Pinellas Plant, St. Petersburg, Florida	4,200
Pantex Plant, Amarillo, Texas	1,000
Rocky Flats Plant, Golden, Colorado	13,700
Mound Facility, Miamisburg, Ohio	14,000
Y-12 Plant, Oak Ridge, Tennessee	31,000
Uncertainties	23,300
Total	$94,500

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Based on preliminary engineering and partially completed conceptual designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine weapon/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 0	$ 3,000	$32,300	$37,500	$15,500	$ 6,200	$94,500
Total facility costs	0	3,000	32,300	37,500	15,500	6,200	94,500
2. Other project funding							
(a) Conceptual design	105	0	0	0	0	0	105
Total other project funding	105	0	0	0	0	0	105
Total project funding (items 1 and 2)	$ 105	$ 3,000	$32,300	$37,500	$15,500	$ 6,200	$94,605 a/

b. Other related funding requirements (estimated life of project: 10 years)

1. Facility operating costs	$12,100
2. Programmatic operating expenses directly related to the facility	27,000
Total other related funding requirements	$39,100

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
1. Other project funding
(a) Conceptual design

Conceptual design costs of approximately $105,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

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a/ This includes $105,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine weapon/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 10 years.

1. Facility operating costs

Facility operating costs of approximately $12,100,000 per year are projected to cover the costs of utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility

Programmatic operating costs of approximately $27,000,000 per year are projected to cover direct labor, fringe benefits, production materials and supplies, and related overhead.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-114

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None
Date:

6. Current cost estimate: $46,800
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$24,100	$24,100	$24,100	$18,400
1985	22,700	22,700	22,700	28,400

8. Brief physical description of project

This project will provide a new manufacturing building and associated support facilities, including a guard post, a cooling tower, and a parking area at the Rocky Flats Plant. All construction will be located on government-owned land within the site boundaries of the Rocky Flats Plant. This project includes security fencing, some new equipment, and relocation of approximately 200 items of existing production equipment currently located in overcrowded, structurally inadequate buildings. This project includes renovation and rehabilitation of vacated space from which relocated equipment is to be removed.

Improvements to land will consist primarily of a new parking area adjacent to the new manufacturing building and modification of existing streets, walks, and security enclosures. A 210,000-square-foot area will be asphalt paved over a gravel base to provide parking for 600 vehicles. Suitable lighting, drainage, parking, and traffic flow markers will be provided. Existing security fencing will be modified to enclose the new manufacturing building, and guard post. Approximately 1,600 feet of 8-foot-high chain link fencing will be installed. Power-operated access gates and security lighting will be provided.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-114

8. Brief physical description of project (contd.)

The new manufacturing building will be a single-story, high-bay structure having approximate dimensions of 350 by 440 by 25 feet high. The building will be a preengineered structural steel or precast twin-tee concrete structure. The main floor will provide approximately 139,000 square feet of usable space. An additional 31,000 square feet of floorspace will be provided by a mezzanine.

Interior firewalls will be built of concrete masonry or double-layered gypsum board. Other walls will be of metal stud demountable construction. Offices, corridors, conference rooms, and laboratories will be provided with suspended acoustical tile ceilings. Fabrication, assembly, utility, and inspection areas will have exposed structural ceilings except for special modular laboratories which require temperature and humidity controls.

Special modular cubicles having reinforced concrete walls and ceilings will be built on the main floor. Eight concrete laboratory modules approximately 19 by 34 feet will be provided with temperature, humidity, and dust controls. These will be equipped for assembly operations, inspection procedures, and standards control. Additional concrete cubicles will include twelve 12 by 20 foot fabrication and test cells. These will have reinforced walls for protection against test-generated shrapnel. One 16 by 16 foot x-ray vault, five 12 by 12 foot x-ray vaults, and one 12 by 20 foot holography cell will have 24-inch-thick walls of concrete designed for radiation shielding.

Isolated rooms with special ventilation and air scrubbers will be provided for electrochemical milling machines.

Equipment to be installed in the new manufacturing building will consist primarily of production machines and equipment currently located in two existing overcrowded, structurally inadequate buildings. This includes approximately 133 machine tools and other process and production support facilities which will be relocated to inspection, nondestructive testing, and standards laboratories. Approximately 75 existing machine tools currently located in hazardous material production areas will be installed in the new building after thorough surface cleaning.

Approximately 75 new production equipment items to be procured under individual weapon systems line items for their individual production needs will be installed in the new building. About 16 new machines procured under current equipment restoration projects will be installed in the new building.

All production machines and equipment will be removed from the existing Manufacturing and General Support Building (Bldg. 881) vacating a 66,500-square-foot area which will be renovated for other uses. Renovation will consist of general refinishing, installation of demountable partitions, drop ceilings, and recessed lighting. The existing ventilation system will be rehabilitated. The building interior will be reconfigured for use as laboratories, shops, and offices to accommodate support, research and development, engineering, and minor shop functions.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-114

8. Brief physical description of project (contd.)

A new 16-by-18-foot guard post will be built at the security fence line for access control to the new manufacturing building. The guard post will be provided with electric heat, fluorescent lighting, telephone service, radio communications, and sanitary facilities.

Utilities to be provided include piping systems, new power equipment and associated power distribution system, fire and security detection systems, and a new cooling tower.

Piping will provide domestic water and fire protection for the new manufacturing building. Deionized water will be supplied to laboratories and test areas. Cooling water will be provided for machines and air-conditioning equipment. Sanitary sewers and process waste lines will be connected to existing mains. Welding and process gases will be provided to fabrication and test facilities, as required. A central hydraulic system will provide service to the tracer lathes. A central filtered coolant and a chuck vacuum system will be provided for machining operations.

A new 250-ton capacity cooling tower with about 1,200 gallons per minute circulating capability will be built complete with associated pumps, piping, and controls. This cooling tower will provide cooling water for equipment and air-conditioning system chillers. It is independent of the evaporative cooling system which will serve the main manufacturing area.

Electrical power for the new manufacturing building and supporting structures will be supplied from a power equipment and distribution system. Motor control centers will be furnished to power motors of 1/2 horsepower or greater. Emergency power systems will be furnished to provide power for test equipment, security lighting, security alarms, and other equipment, as required.

Standard equipment to be provided by this project includes building cranes; compressors; and furniture for offices, laboratories, a conference room, and a cafeteen.

The requested FY 1984 funding will be used for engineering and start of construction on the building, utilities, and power distribution system.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide suitable working space essential for the production of nonnuclear weapons components at the Rocky Flats Plant.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado	2. Project No.: 84-D-114

9. Purpose, justification of need for, and scope of project (contd.)

Existing manufacturing buildings are overcrowded. Nonnuclear manufacturing at Rocky Flats is performed in two major buildings, Building 881 (Manufacturing and General Support Building) and Building 444 (Production Shop). These buildings were at capacity in late 1981.

This project provides for expansion of the Rocky Flats nonnuclear manufacturing capability by providing a new building and by reorganizing and rehabilitating existing overcrowded nonnuclear manufacturing space. Equipment and production support facilities, such as nondestructive testing equipment, will be removed from existing space and reinstalled in the new building. Space will be provided in the new building to accommodate dedicated nonnuclear production equipment provided by current weapon line item construction projects. Approximately 22,000 square feet of additional production floorspace will be provided in the new building to support war reserve production planned for the next 10 years. Vacated manufacturing space in existing Building 881 will be converted to laboratories, shops, and offices.

Building 881, built in 1953 for other uses, has been gradually changed over to general support and nonnuclear manufacturing activities. The building is structurally not suited to high-density machinery operations. New equipment acquired to increase production capability and capacity, and larger equipment acquired to replace obsolete equipment cannot be accommodated within existing manufacturing areas. Precision machines currently installed in this building are experiencing substantial vibrations. To dampen these vibrations, the floors have been braced from the underside. Inefficient production has resulted, schedules are missed, scrap is increased, and machine time is lost. FY 1982 production requirements are being met with difficulty by this facility. To meet production requirements until 1985, when the new consolidated nonnuclear manufacturing facility will be available, it will be necessary to reorganize and remove some support activities from the building, lease offsite space for a chemical instrumentation group, and convert the cafeteen to production space.

Building 444 currently provides facilities for production of components using radioactive, pyrophoric, and toxic materials, as well as production of nonradioactive and hazardous materials. Vanadium, depleted uranium, and other nonradioactive materials are machined in the same area and frequently on the same equipment. Mixing the manufacturing of radioactive and nonradioactive components raises the number of people who are unnecessarily exposed to radioactive and toxic material. Scrap from the current radioactive material and requires disposal as nuclear waste. Relocating nonradioactive production operations (stainless steel, aluminum, and vanadium) to the new manufacturing building would significantly reduce the number of people exposed to radiation and the amount of contaminated scrap.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-114

9. Purpose, justification of need for, and scope of project (contd.)

The production area dedicated to nonradioactive production operations in Building 444 is approximately 15,000 square feet. During the next 4 years, an additional 8,500 square feet will be required. In order to obtain space prior to the availability of the new consolidated nonnuclear manufacturing facility, production facilities will be expanded into the precision tool grinding shop which will be relocated, into the cafeteen which will be closed, and into space vacated by tool engineering and production control and scheduling activities. In addition, production schedules will be increased from two shifts to three shifts per day, as required.

To meet current production space requirements in Building 444, support functions have been removed from the building and office spaces have been converted to maufacturing.

In 1981, approximately 300 people were relocated to obtain production space in the above building. Some are located in temporary buildings onsite and approximately 225 are located in leased space approximately 12 miles from the Rocky Flats Plant. The cost to the government for this lease is currently $1,100,000 per year.

Three alternatives to construction of the new consolidated nonnuclear manufacturing facility have been examined. Certain production activities previously assigned to Rocky Flats were recently reassigned elsewhere in the weapons production complex. The complex is now at the point where each production plant is currently, or will be in the near future, committed to the point that it will have no excess capacity for work outside its current mission assignment. Leasing additional offsite office space and leasing offsite manufacturing space was examined. Most of the functions which were considered for offsite office space involve processing classified material with the plant's main computer and could not be appropriately relocated offsite. An offsite manufacturing facility would require acceptable security since classified parts would be processed. In addition, it is doubtful that an offsite manufacturing facility could be found that would also provide the necessary concrete cells needed for physical testing and x-ray procedures. Considering current interest rates and government guidelines limiting lease rates to no more than 15 percent of the appraised value per year, it is doubtful that the government could have a lease facility built to fill our special needs. Subcontracting for piece-part manufacturing by offsite vendors (machine shops) is continuously considered as a potential means of meeting production schedules. Rocky Flats has made a concentrated effort over the past five years to develop qualified "Q"-cleared manufacturing businesses. Two qualified shops have been cleared to date. Both shops are heavily loaded. Additional outside vendors will be required and are being sought.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-114

9. Purpose, justification of need for, and scope of project (contd.)

Current workload projections and assessment of the production space available at the Rocky Flats Plant to meet the required schedules clearly establishes the need for the new consolidated nonnuclear manufacturing building.

Plans have been made to relocate personnel and functions temporarily until the new building can be completed. Renovation of space vacated in Building 881 will permit return of personnel from offsite accommodations.

10. Details of cost estimate a/		Item cost	Total cost
a. Engineering, design, and inspection at approximately 16% of construction costs, item b ..			$ 5,260
b. Construction costs			32,950
(1) Improvements to land		$ 910	
(a) Lighted parking lot approximately 210,000 square feet at about $4 per square foot	$ 870		
(b) Lighted security fencing	40		
(2) Buildings		13,570	
(a) Basic manufacturing building with mezzanine, approximately 170,000 square feet at about $73 per square foot	12,340		
(b) Renovation of existing building, approximately 66,500 square feet at about $17 per square foot	1,160		
(c) Guard post	70		
(3) Special facilities		15,910	
(a) Test cells, x-ray vaults, laboratories, and concrete structures with climate controls	11,970		
(b) Relocation of production equipment, machinery, and testing systems	3,940		
(4) Utilities, including electrical power and distribution system, cooling tower, piping and services to new building, and utilities for guard post		2,560	
c. Standard equipment			2,790
Subtotal			41,000
d. Contingency at approximately 14% of above costs			5,800
Total estimated cost			$46,800

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a/ Estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado
2. Project No.: 84-D-114

11. Method of performance

General engineering design and inspection will be performed under a negotiated architect-engineer contract. The building will be built under a fixed-price, design-construct contract awarded on the basis of competitive bidding. Other construction will be accomplished by a fixed-price contract awarded on the basis of competitive bidding. Procurement of long-lead delivery items will be accomplished by the operating contractor under an existing cost-type contract. Equipment relocation and installation will be accomplished by a construction contractor under an existing cost-type contract.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 0	$18,400	$28,400	$46,800
Total facility costs	0	18,400	28,400	46,800
2. Other project funding				
(a) Conceptual design	28	0	0	28
(b) Preliminary engineering and design	600	0	0	600
Total other project funding	628	0	0	628
Total project funding (items 1 and 2)	$ 628	$18,400	$28,700	$47,428 a/

b. Other related funding requirement (estimated life of project: 10 years)

1. Facility operating cost	$ 4,250
2. Programmatic operating expenses directly related to the facility	57,100
Total other related funding requirements	$61,350

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding
   - (a) Conceptual design was prepared by the Rocky Flats Plant operating contractor at a cost of $28,000.
   - (b) Design criteria, additional feasibility and conceptual studies, and design-construct documents for soliciting for the building shell will be prepared using FY 1983 operating funds.

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a/ This amount includes a total of $628,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Consolidated nonnuclear manufacturing facility, Rocky Flats Plant, Golden, Colorado	2. Project No.: 84-D-114

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

1. Facility operating costs
   (a) Facility operating costs are projected to cover the cost of utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility
   (a) Programmatic operating expenses are projected to cover direct labor, fringe benefits, production materials, and supplies and related overhead.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Electrical system expansion,
Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-115

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. 1985

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $15,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 1,500	$ 1,500	$ 1,500	$ 900
1985	13,500	13,500	13,500	3,300
1986	0	0	0	8,700
1987	0	0	0	2,100

8. Brief physical description of project

This project provides for expansion of the electrical utility equipment and electrical distribution system at the Pantex Plant, Amarillo, Texas. The project will provide a new transmission line, new distribution lines, new underground ducts, conversion of selected existing overhead distribution systems to underground distribution, and emergency generators; and will modify selected motor control centers and panels within existing buildings.

A new electrical power transmission line will connect existing transmission lines to form a loop that will serve existing plant substations. Approximately 15,000 feet of new 115,000-volt line shall be connected to existing lines within the plant property owned by the local utility and to Government-owned transmission lines that feed the plant substations. The new line will conform to industry standards and will be compatible with local weather conditions. Conductors will be three 4/0 aluminum cables (steel reinforced) supported on typical 60-foot, wooden pole, H-frame structures. Each pole will be equipped with single-strand, static-grounding wire and two-stranded, galvanized steel cables between the power line supports will provide static-grounding protection.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Electrical system expansion, Pantex Plant, Amarillo, Texas
2. Project No.: 84-D-115

8. Brief physical description of project (contd.)

Circuit breakers and controls will be installed at strategic locations to isolate sections of the new line during faulted circuit conditions. Approximately 26,000 feet of existing transmission line will be modified to meet industry standards and will be incorporated in the loop system.

Underground 12,000-volt electrical distribution ducts will be built in the main plant production and production support areas (Zone 12) and in the main development area (Zone 11). The new underground ducts will provide added electrical loops for redundant electrical distribution to existing facilities and buildings. Approximately 18,500 linear feet of new underground duct will be built. Typical underground duct will consist of concrete-encased, polyvinyl chloride plastic pipe buried 4 feet below grade. Approximately 50 standard monolithic manhole units will be installed at corners and bends in the duct to accommodate connections to plant building feeder circuits. The underground duct construction will include installation of transfer switches, modifications to existing switchgear, transition facilities to the existing 15,000-volt distribution system, and connections to existing substations. The new underground duct system will complete an electrical feeder loop in the southeast production area by connecting with existing underground ducting. Electrical service to buildings in the production and production support areas will be converted from the 12,000-volt overhead distribution system to an underground system. This will bring the power supply into compliance with policy for production facilities. Conversion will provide new underground duct, single- and double-ended substations, and switchgear to serve the buildings. Approximately 14 transformers and 14 transfer switches will be installed. In the Zone 12 production support area, the new 12,000-volt duct system will connect the underground loop system to existing substations and will provide feeder circuits to existing buildings. In the development area, Zone 11, the new underground duct will interconnect high-priority buildings.

The staging area, Zone 4, will be provided with an alternate 12,000-volt distribution overhead power line. New switchgear and a segment of overhead power lines will be installed to connect a 12,000-volt distribution line nearby with the Zone 4 distribution system. Modification of an electrical service line to the plant's west water tower will include partial replacement of poles and modification of crossarms and hardware.

Motor control centers and building power distribution panels will be installed in approximately 13 buildings located in the production and development zones. Approximately 270 panels are included in this project. However, the exact locations and numbers of motor control centers and panels will be refined by ongoing site master planning efforts.

A new 40-kilowatt generator with associated underground fuel tanks, automatic transfer switch, and transformer will be installed in the north end of the production support area to provide security lighting under emergency conditions. A 75-kilowatt generator with associated fuel tanks and appurtenances will be installed in the development area to provide emergency security lighting.

The requested FY 1984 funding will be used for design of the new facility.

1. Title and location of project: Electrical system expansion,
Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-115

9. Purpose, justification of need for, and scope of project

This project will provide additional power distribution facilities to meet a projected doubling of peak demand by 1989 and will improve the reliability of the entire plant distribution system. The improvements are needed to ensure reliability of electrical power to production facilities and to permit isolating and deenergizing parts of the system for repair and maintenance. At present, most of the overhead distribution system cannot be deenergized for repair and maintenance without power shutdowns on production activities. Repairs must be made on "live" circuits. For lack of alternative distribution circuits, preventative maintenance is delayed and electrical transmission equipment must perform beyond expected cycles of maintenance.

A single main power line that feeds the Pantex Plant and the existing overhead distribution system that serves part of the production area was built in 1952. Existing underground power distribution facilities which serve part of the production area were built in 1970. The existing electrical system serving the Pantex Plant's operations is complex and involves some unsafe switching arrangements, some outdated motor control centers and panel boards, some overhead distribution lines that have reached their design life, and some direct burial cable systems which are uneconomical to repair. Authorized restoration projects have replaced essentially all the poor and inadequate elements in this electrical system. This project will augment the restoration work on the electrical system by upgrading and expanding the system to meet increasing power demands. Age is not a major justification for construction of new distribution facilities. Additional capacity and an alternative main power feeder are needed to ensure reliability and to permit deenergizing for preventative maintenance. The project will establish loop feeders to provide redundant power services for existing operations and new facilities. Added segments of electrical loops will provide redundant capability which will allow most plant operations to continue uninterrupted if a single component failure should occur and will permit isolation and repair of equipment without adverse effects on the weapons production commitments.

The present capacity of the existing power distribution systems is limited by primary transformer capacity of 17.5 MVA. The first of two primary transformers, a 7.5 MVA transformer, was installed as a part of the original power distribution system in 1952. A 10.0 MVA primary transformer was installed in FY 1970.

The following table of peakload projections shows that it is not now possible to deenergize the 10.0 MVA transformer for maintenance or repair and, after 1985, it would not be possible to deenergize either of these without additional transformer capacity. An additional primary 10.0 MVA transformer will be provided under Project 78-16-a, Cruise Missile Production Facilities, Various Locations; it is scheduled to be online in late 1986.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Electrical system expansion, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-115

9. Purpose, justification of need for, and scope of project (contd.)

CY	Projected Peakload (MVA)
1982	8.6
1983	9.5
1984	10.0
1985	11.5
1986	12.4
1987	13.6
1988	15.9
1989	19.0
1990	19.5
1991	19.9
1992	20.3

This project, scheduled for completion in late 1987, will upgrade the reliability and capacity of the power distribution system by adding an alternative transmission line and new distribution facilities.

The proposed additions and modification of the 115,000-volt transmission line will complete a looped-circuit feeder that will reduce the frequency of power outages and shorten their durations.

The underground duct systems will improve reliability of the existing power service by providing required redundancy and will provide additional power distribution capacity. Added segments of underground duct will complete loop circuits in the existing distribution system. Existing direct-buried distribution lines have been a source of interruption in operations due to difficulties in locating faulted conditions and time-consuming excavation involved in repair. To correct this problem, the direct-buried distribution system will be replaced by an underground duct system which will concurrently provide increased capacity for this area.

A new overhead distribution line for the staging area will increase the reliability of power service in an area served by only one power source.

Security lighting during power failures will be ensured by installation of new emergency generators. Existing undersized emergency generators will be replaced.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Electrical system expansion,
Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-115

9. Purpose, justification of need for, and scope of project (contd.)

A site master planning study currently in progress and scheduled for completion in 1984 will identify as essential much of the work to be completed by this project. This project will accomplish electrical construction to be recommended in the master plan.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 20% of construction costs, item b		$ 2,140
b. Construction costs		10,900
(1) Utilities		
(a) Transmission line	$1,760	
(b) Underground ducts	7,790	
(c) Overhead distribution line	320	
(d) Motor control centers and building power panels	950	
(e) Emergency generator installations	80	
Subtotal		13,040
c. Contingency at approximately 15% of above costs		1,960
Total estimated cost ...		$15,000

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by a fixed-price contract awarded on the basis of competitive bids.

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a/ Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Electrical system expansion, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-115

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 900	$ 3,300	$ 8,700	$ 2,100	$15,000
Total facility costs	0	900	3,300	8,700	2,100	15,000
2. Other project funding						
(a) Conceptual design	25	0	0	0	0	25
Total other project funding	25	0	0	0	0	25
Total project funding (items 1 and 2)	$ 25	$ 900	$ 3,300	$ 8,700	$ 2,100	$15,025 a/

b. Other related funding requirement (estimated life of project: 20 years)

1. Facility operating cost	$83,000
Total other funding requirements	$83,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

Conceptual design for this project was prepared by the operating contractor at a cost of $25,000.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

Facility operating costs of $83,000 per year are projected. This includes maintenance, labor, materials and supplies, plus janitorial and utility services.

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a/ This total includes $25,000 from years prior to FY 1984.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Inert assembly and test facility, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-117

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $13,600
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 1,500	$ 1,500	$ 1,500	$ 800
1985	12,100	12,100	12,100	4,400
1986	0	0	0	8,400

8. Brief physical description of project

This project provides a new building for use in assembling and testing inert (nonnuclear) warheads and a covered walkway (ramp) connecting to adjacent facilities.

A new 47,000-square-foot, high-bay building will be built at the Pantex Plant. The new building will be a single-story, manufacturing building with mezzanines for offices and part of the mechanical equipment. Ceiling height in the work areas will be 22 feet. The building will be constructed of reinforced concrete. A firewall will be provided to isolate the maximum fire loss to $25,000,000. The new building will include a manufacturing area, a quality area, a software support room, a record storage area, a mechanical equipment room, offices, a combustible storage area, a break area, a janitor's closet, and restrooms.

The manufacturing area will provide about 9,600 square feet of work space and 3,200 square feet of storage area. The manufacturing space will be divided into work areas. Each work area will be provided with an air-operated, 1,000-pound capacity bridge crane and hoist. Each work area will be provided with compressed air, vacuum, and electrical outlets. Movable exhaust systems will be provided for use in gluing operations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Inert assembly and test facility,
Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-117

8. Brief physical description of project (contd.)

The quality area will include eight 25-by-30-foot work areas. Four jib cranes and hoists with 1,000-pound capacities will service the quality area. Compressed air, vacuum, and electrical outlets will be located throughout the area.

Support areas will provide working space for the staging of parts and tools, line supervision offices, computer software, and record storage.

Protected passage from the building to adjacent facilities will be provided by a covered walkway (ramp) approximately 120-feet long. This will be a preengineered metal structure approximately 18-feet wide. The floor will be sealed concrete. Lights, emergency lights, and lightning protection will be provided.

Heating and air-conditioning systems will maintain environmental conditions in the manufacturing and quality areas, offices, combustible storage areas, software support areas, and record storage areas. In the work and storage areas the temperature will be controlled by water chillers and optimum heat sources to 73°F ± 3° and the relative humidity will be controlled to 15 percent. The remainder of the building will be controlled to 78° in the summer and 68° in the winter. Process vacuum and compressed air will be supplied from pumps and compressors installed in the mechanical rooms. The building will be protected by an automatic wet-pipe sprinkler system.

Special facilities included in this project include portable shields to screen off work areas where small quantities of high explosives (up to 0.5 pounds) are present. Missile protection will be provided for personnel working in other parts of the facility. A life cycle cost analysis was performed on an energy conservation scheme for this building which includes a solar collector, additional insulation, an automated energy management system, and efficient lighting. The estimated additional project cost attributable to energy conservation measures and solar energy augmentation is $295,000. The value of energy that can be saved by the energy conservation scheme over the life of the building is estimated at $1,600,000. A parabolic solar collector system is included in the special facilities planned for this building.

Utilities will be provided by extending existing services, including water lines, electrical distribution lines, telephone, public address, fire alarm, and security alarms.

Standard equipment will include bridge cranes, jib cranes, hoists, forklifts, handlifts, storage shelving, work tables, and office equipment.

The requested FY 1984 funding will be used for design of the new facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Inert assembly and test facility, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-117

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide additional capacity to assemble and test inert (nonnuclear) warheads. This additional capacity is essential to meet existing production commitments after FY 1986.

An integral part of the nuclear weapons production program at the Pantex Plant includes the building of some inert or mock nuclear weapons. These contain no fissile materials and no significant quantity of high explosives. Most of these inert weapons are required for use in the DOE/DOD quality assurance program for operational and vulnerability testing and for training. Many of these inert weapons, called Joint Test Assemblies (JTA), are configured for use in firing test programs and for drop test programs conducted by the DOD. A JTA unit is comprised of war reserve weapon components, plus one or more subassemblies (such as telemetry units) substituted for the critical components.

The physical appearance and characteristics of an inert weapon approximates a war reserve weapon. Some JTA's are rebuilt using war reserve weapons recalled from the stockpile, subsequently disassembled, and reassembled in an inert configuration with subassemblies appropriate to the intended use. Some JTA's are prebuilt as new production units and shipped to the stockpile for typical storage and handling. Some inert "type" weapons are built for training military personnel in handling, arming, and firing the war reserve weapon.

Currently, inert weapons are assembled and tested in the same facilities used for production of war reserve nuclear weapons. Existing facilities for assembling and testing nuclear warheads are at maximum utilization and will require extensive rearrangements and operational changes to support the weapon systems entering production in FY 1985. Temporary changes have been scheduled to help overcome the lack of capacity.

To meet new commitments beyond FY 1985, additional assembly and testing capacity must be obtained. Most of the weapon systems in the stockpile and in production have active requirements for inert warheads. As new weapons programs enter production, the requirements for inert warhead assemblies increases. It is now appropriate to separate the preparation of inert warheads from war reserve production to relieve overcrowding and, at the same time, remove some personnel from unnecessary exposure to danger from potential accidents associated with assembling hundreds of pounds of high explosives and kilogram quantities of fissile material. The new stockpile assurance facility will provide workspace for 100 persons.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Inert assembly and test facility,
Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-117

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 20% of construction costs, item b		$ 1,900
b. Construction costs		9,570
(1) New building, approximately 47,000 square feet at about $165 per square foot	$ 7,750	
(2) Other structures, covered walkway	60	
(3) Special facilities, including solar collector system	1,590	
(4) Utilities	170	
c. Standard equipment		550
Subtotal		12,020
d. Contingency at approximately 13% of above costs		1,580
Total estimated cost ...		$13,600

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction will be accomplished by a fixed-price contract awarded on the basis of competitive bids. The operating contractor will procure and install selected equipment items.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item....................	0	800	4,400	8,400	13,600
Total facility costs	0	800	4,400	8,400	13,600
2. Other project funding					
(a) Conceptual design	60	0	0	0	60
Total other project funding	60	0	0	0	60
Total project funding (items 1 and 2)	$ 60	$ 800	$ 4,400	$ 8,400	$13,660 b/

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a/ Based upon completed project design.

b/ Includes $60,000 from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Inert assembly and test facility, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-117

12. Pending schedule of project funding and other related funding requirements (contd.)

b. Other related funding requirements (estimated life of project: 15 years)

1. Facility operating costs	$ 520
2. Programmatic operating expenses directly related to the facility	2,540
Total other related funding requirements	$ 3,060

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

The only funding in this category is the $60,000 spent for conceptual design of this project in preparation for budget submittal.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be at least 15 years.

1. Facility operating costs include utilities, plus labor, material, and supplies for maintenance and janitorial services.

2. Programmatic operating expenses include the personnel costs for those assigned to work in the facility, plus $40,000 for minor materials and supplies.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High-explosive subassembly facility, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-118

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $60,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 7,000	$ 7,000	$ 7,000	$ 5,000
1985	40,000	40,000	40,000	10,000
1986	13,000	13,000	13,000	25,000
1987	0	0	0	20,000

8. Brief physical description of project

This project consists of the design and construction of a 16-unit high-explosive subassembly bay complex at the Pantex Plant, Amarillo, Texas, which will become part of a 36-unit high-explosive subassembly bay complex planned to accommodate future workload increases. The 16-unit complex will include high-explosive subassembly bays, tool staging areas, inert materials staging areas, corridors, ramps, equipment rooms, fan buildings, restrooms, supervisory office space, and break rooms. In addition to design and construction of the initial 16 units, this project will provide engineering planning effort necessary to establish a layout for the entire 36-unit complex, identifying necessary utility relocations, locating and sizing new uiltilies, and access requirements. Based on this effort the building site will be laid out and reserved for the 36-unit complex. Construction under this project will provide for completion of a 16-unit complex appropriately located and provided with utilities and access sized to permit later extension to accommodate the 36-unit facility, when and if authorized.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: High-explosive subassembly facility,
Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-118

8. Brief physical description of project (contd.)

Site preparation will include site grading to provide surface drainage for the 16-unit subassembly bay complex. Reinforced concrete pipe culverts will be installed at ramp and road crossings. Approximately 2,000 feet of temporary security fencing will be installed around the construction site. Demolition of a small segment of existing covered walkway (ramp) will be necessary to provide for connection with the new facilities.

The 16 subassembly bays with supporting staging areas, equipment rooms, and offices will be built as an integrated reinforced concrete structure of approximately 56,000 square feet in gross area. Each subassembly bay will contain approximately 1,600 square feet of usable floor space. The subassembly bays with blast doors, interlocks, security doors, and vestibules will be totally noncombustible. The subassembly bays will be earth-covered and sealed with an asphalt liner to provide erosion control. Environmental controls will be provided to maintain the working area at 73°F ± 3°F, with a maximum absolute humidity of 15 grains per pound of dry air. Each bay will be designed for Class II hazard operations as defined in DOE Order 6430, Chapter XXII. The design will provide for up to 300 pounds of high explosive in each bay and will recognize recently completed physical tests made on earth-covered assembly bays to obtain design information pertaining to compliance with current DOE safety criteria. Each bay will be provided with a hoist with powered bridge and trolley. High-explosive subasembly operations in these bays may involve special nuclear materials; therefore, radiation monitoring equipment may be installed in part or all of the bays.

Support facilities directly associated with the 16 subassembly bays include a fan building (1,500 square feet) on the bay roof, combustible storage area (2,600 square feet), corridors (7,700 square feet) and inert materials and tester staging areas, mechanical and electrical room, break areas, restrooms, and quality and manufacturing areas (5,400 square feet).

Approximately 1,200 lineal feet of covered walkway (ramp) will be required to join the 16-unit subassembly bay complex with the manufacturing areas and the weapon assembly areas. This structure will be approximately 17-feet wide and 13-feet high and will consist of preengineered metal building structure on a 6-inch concrete slab.

Utilities include a sanitary sewer, fire protection, a water distribution system, and a new electrical distribution system. The electrical system will include a new underground primary service and transformers. Utilities will be sized to handle the requirements of the complete 36-unit complex, when and if extended. Provision is made in this project for energy conservation. Energy-efficient lighting will be used in the facility. An automated energy management system will be connected to the heating, ventilating, and air-conditioning system to reduce ventilation rates and dehumidification during unoccupied periods. The building will have no windows. Direct exits from the building are for emergency exit only. The percent of fenestration to gross wall is about 3 percent. A life cycle cost analysis indicates significant merit in including major energy

1. Title and location of project: High-explosive subassembly facility, Pantex Plant, Amarillo, Texas	2. Project No.: 84-D-118

8. Brief physical description of project (contd.)

conservation features in this project. Projected energy use reduction based on a solar collection system considered in the conceptual design indicates a potential for cost savings of about $3 million over the life of the building at a cost for energy conservation and renewable energy facilities estimated at $1.3 million.

Standard equipment will include two electric forklifts with batteries, building hoists, and equipment installed.

The requested FY 1984 funding will be used for architect-engineer design and preparation of bid documents for construction of a 16-unit high-explosive subassembly bay complex and for engineering planning of the larger complex.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide additional high-explosive subassembly bays needed to meet workload projections starting in the third quarter FY 1987.

Currently, there are 24 subassembly bays at the Pantex Plant. Beginning in the third quarter of FY 1987, a total of 40 subassembly bays will be required to meet the projected weapon production workload.

A total of 60 subassembly and assembly bays will be required to support a 5-day-per-week, 2 shift-per-day operation beginning in the third quarter of FY 1988. This project will provide design and construction of the 16 units needed to meet the FY 1987 workload. Funding for the remaining 20 subassembly bays will be requested for FY 1985 barring changes in the current workload projections. All of the new weapons systems scheduled will require additional subassembly and assembly bays. The safety criteria and work areas for both types of structures are very similar. In order to provide facilities with flexibility for either function, design criteria for assembly bays will be adopted for the new subassembly bays. It is apparent that any delay in the completion progress of the initial 16-unit subassembly complex will require operating the existing subassembly facilities on an extended work week. Conservative estimates of leadtimes for design and construction of the initial 16-unit complex indicates that these facilities may not be fully operational until the second quarter of FY 1988. Additional work shifts for short periods are an acceptable working technique.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: High-explosive subassembly facility, Pantex Plant, Amarillo, Texas	2. Project No.: 84-D-118

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 25% of construction costs (16-unit subassembly complex), plus planning for a 36-unit complex		$10,000
b. Construction costs		40,500
(1) Improvements to land	$ 1,000	
(2) Buildings, reinforced concrete, earth-covered, approximately 73,000 square feet at $460 per square foot	33,500	
(3) Special facilities, including solar collectors	1,000	
(4) Ramp	2,000	
(5) Utilities	3,000	
c. Standard equipment		1,500
Subtotal		52,000
d. Contingency at approximately 15% of above costs		8,000
Total estimated cost		$60,000

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive bidding. Construction will be administered by a construction management firm under contract to the DOE. Minor equipment procurement and installation will be performed by the operating contractor who will also complete communications and detection system installation.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 5,000	$ 10,000	$ 25,000	$ 20,000	$ 60,000
Total facility costs	0	5,000	10,000	25,000	20,000	60,000

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a/ Based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: High-explosive subassembly facility, Pantex Plant, Amarillo, Texas
2. Project No.: 84-D-118

12. Pending schedule of project funding and other related funding requirements (contd.)

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
2. Other project funding						
(a) Conceptual design	$ 130	$ 0	$ 0	$ 0	$ 0	$ 130
Total other project funding	130	0	0	0	0	130
Total project funding (items 1 and 2)	$ 130	$ 5,000	$ 10,000	$ 25,000	$ 20,000	$ 60,130 a/

b. Other related funding requirements (estimated life of project: 30 years)

1. Facility operating costs	$ 880
2. Programmatic operating expenses directly related to the facility	2,000
Total other related funding requirements	$ 2,880

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design cost of approximately $130,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of these facilities will be at least 30 years.

1. Facility operating costs

Approximately $880,000 per year will be spent to cover the cost of utilities, maintenance, janitorial services, and related overhead costs.

2. Programmatic operating expenses directly related to the facility

The annual cost of direct labor, overhead, and minor materials and supplies is estimated at $2,000,000 per year while operating at full production.

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a/ This total includes $130,000 which is from years prior to FY 1984.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Railroad track replacement and upgrade, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-119

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1985

4. Date construction ends: 3rd Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $7,800
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 800	$ 800	$ 800	$ 400
1985	7,000	7,000	7,000	1,600
1986	0	0	0	3,900
1987	0	0	0	1,900

8. Brief physical description of project

This project will increase the load-carrying capacity of the railroad track system serving the Pantex Plant, Amarillo, Texas. The existing railroad track, built in 1942 as part of a World War II ordinance plant, is extensively deteriorated by age and use and requires substantial reconstruction to handle present and projected loadings. This project will realign the track system adding a 2.6-mile-long new lead track connecting to the carrier's mainline; rebuilding about 4 miles of existing track for greater load-carrying capacity; and demolishing about 9.1 miles, which will be excluded from the realigned system.

Site work will include clearing the right-of-way of all vegetation and improvement of drainage by provision of ditches and culverts. The right-of-way will be fenced and openings will be provided for local access.

The roadbeds for the new track and for the replacement of the old track will be filled with compacted earth material. The minimum subgrade width will be 17 feet 6 inches at the top. Ballast will be crushed limestone with a minimum of 8 inches between subgrade and ties. Hardwood, creosote-treated crossties will be used. New 136-pound-per-yard rail will be used for the new track. New track construction will include the necessary switches, tie plates, joint bars, anchors, etc.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Railroad track replacement and upgrade, Pantex Plant, Amarillo, Texas

2. Project No.: 84-D-119

8. Brief physical description of project (contd.)

The existing lead track will be of no further use and will be removed.

The FY 1984 funding requested will be used for design of this project.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to eliminate serious deficiencies in the existing railroad track system that serves the Pantex Plant.

The Pantex nuclear weapons assembly plant was established early in the 1950's on the site of a World War II ordinance manufacturing plant built in 1942 and closed in 1946. The original railroad track system was apparently designed for temporary service and involved the use of used track and associated hardware. When the plant site was reactivated for work on nuclear weapons, additional track was laid, again using used materials.

Over a period of nearly 40 years, the existing trackage has seriously deteriorated, while concurrently the loading requirements at the plant have increased. The original drainage, if provided, has ceased to exist. The roadbed is generally deteriorated. The lightweight track, mostly 80- and 85-pound-per-yard rail, is not safe or satisfactory for the loads currently imposed by the 180-ton and 115-ton locomotives used to transport ATMX safe/secure railcars. An ultrasonic examination was performed on all tracks during 1981. Approximately 80 flaws were identified, about one-third of these are considered serious defects. Derailment accidents to date have involved only locomotives; no sensitive cargo-carrying units have been derailed. The Santa Fe Railroad Company restricts the speed of their equipment on the DOE track to very slow, 5 to 10 miles per hour, because of the poor track condition.

A steam plant, to be centrally located in the Pantex Plant, is under design to convert plant heating requirements from oil and gas fuel to coal and to generate part of the plant's electrical power requirements. The current project schedule calls for the coal-fired steam plant to go into service in FY 1987. The coal trains required to stockpile fuel for this plant will exceed any loads currently imposed on the railroad track by weapons activities. Several coal trains per month will be required to fuel the new plant after FY 1987. FY 1984 funding for this project will facilitate completion of the railroad track replacement and upgrade in late FY 1987.

Economies in maintenance and repairs are expected with completion of this project. An estimated $500,000 per year will be saved by elimination of about 9 miles of seriously deteriorated track.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Railroad track replacement and upgrade, Pantex Plant, Amarillo, Texas
2. Project No.: 84-D-119

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 16% of construction costs, item b	$ 900
b. Construction costs, including approximately 6.6 miles of new and upgraded track	5,500
c. Removal cost, less salvage for approximately 9 miles of abandoned track	400
Subtotal	6,800
d. Contingency at approximately 15% of above costs	1,000
Total estimated cost	$7,800

11. Method of performance

Design and engineering will be performed under a negotiated architect-engineer contract. Construction will be accomplished by fixed-price contract awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 400	$ 1,600	$ 3,900	$ 1,900	$ 7,800
Total facility cost	0	400	1,600	3,900	1,900	7,800
2. Other project funding						
(a) Conceptual design	25	0	0	0	0	25
Total other project funding	25	0	0	0	0	25
Total project funding (items 1 and 2)	$ 25	$ 400	$ 1,600	$ 3,900	$ 1,900	$ 7,825 b/

b. Other related funding requirements (estimated life of project: 30 years)

1. Facility operating costs	$ 200
Total other related funding requirements	$ 200

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a/ Based upon completed conceptual design.

b/ Includes $25,000 from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Railroad track replacement and upgrade, Pantex Plant, Amarillo, Texas	2. Project No.: 84-D-119

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

The estimated cost for completing the conceptual design for this project is $25,000.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 30 years.

1. Facility operating costs

Facility operating costs estimated at $200,000 per year include maintenance labor, materials, and supplies.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Explosive component test facility, Mound Facility, Miamisburg, Ohio

2. Project No.: 84-D-120

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 4th Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $21,900
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$13,100	$13,100	$13,100	$ 5,500
1985	6,900	6,900	6,900	7,700
1986	1,900	1,900	1,900	8,700

8. Brief physical description of project

This project will provide a new single-story building of approximately 28,000 square feet. Construction will be tilt-up concrete walls. Space allocations will be made for three large, high-explosive test cells (each 15 feet in diameter and 24 feet in length); for test engineering and administrative functions; and for additional small, self-contained test cells. A new electrical substation and necessary utility extensions will be provided. Existing magazines and storage facilities will be relocated.

Site preparation will include nominal relocation efforts to reroute two paved roads which cross the building site. Two 20-year-old storage buildings, each having approximately 1,800 square feet of floor space, will be removed and replaced at a nearby location. High-explosives magazines near the new building site will be decommissioned or reduced in storage capacity for safety of the new explosive component facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Explosive component test facility,
Mound Facility, Miamisburg, Ohio

2. Project No.: 84-D-120

8. Brief physical description of project (contd.)

The new explosive component building will be a single-story building approximately 280 feet long and 100 feet wide. Construction of the building will be load-bearing cast concrete, tilt-up walls with an ongrade concrete slab floor. It will house three large testing tanks, each about 15 feet in diameter and 24 feet in length, with exhaust systems terminating in a single-shared exhaust expansion chamber and emission control separator. The tanks will be set in shallow pits with independent foundations. The use of pits for the testing tanks minimizes the ceiling heights required and facilitates utilization of the tanks. Approximately 20,000 square feet of the building will be allocated to test operations. This will include the large test tanks with adjacent control rooms and test preparation rooms. A large room will be equipped for single-point, self-contained testers. Service facilities immediately adjacent to the testing areas will include photographic development rooms and segregated high explosives and pyrotechnic preparation rooms. An electronics calibration standards laboratory, a tester fabrication area, and maintenance shops will be provided. Space will be provided for technicians' desks, files, and secure storage.

Engineering and administrative offices will be allocated approximately 2,500 square feet of space. The remainder of the building will be allocated to lobby, corridors, washrooms, change rooms, loading dock, and building support including mechanical equipment and janitorial.

A new inside 1,000 kVA unit substation will be provided for the new building. Power will be supplied via underground ducts to existing high-voltage underground lines about 160 feet from the building site. Electrical systems in all hazardous areas within the building will be explosion-proof construction. An extensive electrical "fail-safe" interlock system will be provided to insure the safety of all personnel and equipment in test firing operations.

Special facilities will consist primarily of the three large detonator test firing cells. Each cell will be a free-standing pressure vessel with no dependence on the surrounding building for structural integrity. Each test cell will be a modified cylinder designed to withstand pressures resulting from a 10-pound TNT equivalent detonation. Test cells will be welded steel construction, certified, and hydrostatically proof tested. Instrumentation and viewing ports for camera recordings will be provided. Access to the interior for test setup will be through a single personnel door. An air inlet will be provided near the top of the cell and an exhaust port will be located near the opposite end. Environmental controls will be provided to control noise and particulate laden gas emissions. A large surge tank will be shared between all test cells to reduce gas pressure in the cell following a detonation. The surge tank will attenuate sound and settle particulates. Gases leaving the surge tank will be filtered through a baghouse and exhausted to the atmosphere. The surge tank, baghouse, and fan will

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Explosive component test facility, Mound Facility, Miamisburg, Ohio

2. Project No.: 84-D-120

8. Brief physical description of project (contd.)

be located outside at the rear of the building. Special equipment will include tester maintenance equipment, tester fabrication equipment, waveform digitalizing systems, automatic firing control systems, high-speed streaking cameras and related photographic equipment, automatic film processors, light source fiducial systems, thermal storage chambers, automatic mechanical function testers, and vibration table with automatic controls.

Utilities will include steam supplied from a central powerhouse, ordinary hazard wetpipe fire sprinkler systems, domestic water, and sanitary service.

The requested FY 1984 funding will be used for architect-engineer design of the building, start of construction, and procurement of test tanks and related special equipment.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide a new facility for testing high explosive components manufactured at the Mound Facility for nuclear weapon systems. Reliability of these components is demonstrated by destructively testing a percentage of each explosive product produced.

Existing production test cells are inadequate and too few in number to support the current product development and assurance testing requirements. The original explosive component test facility was built in 1957 to support a single weapon system. Since then expansion required to meet the needs of each new weapon system was handled in a piecemeal add-on fashion. This previous support activity has since evolved into a highly complex, sophisticated resource for both development and product assurance testing. To further complicate this situation, the workload has increased substantially. The need for expansion of the existing capacity is critical and becoming urgent. Currently, existing test cells are too few in number and too outmoded in design to support both the current long-range product testing program and the new development and test programs. The problem becomes increasingly acute with time since more new programs are undertaken each year than are discontinued or completed, and continuing surveillance of active stockpile systems remains a requirement. The described changes to the current facilities will correct the inadequate capacity situation by appreciably increasing the number and size of cells available for tests, and will significantly improve test efficiency through arrangement of the cells, control and preparation rooms, in the most usable manner. This arrangement will enable increased and more accurate data accumulation from each test shot as well as much-needed test flexibility. New technologies to be provided by the new explosive test component facility are essential to meet current and future testing requirements. If this project is not funded in FY 1984, it will be necessary to adopt an unsatisfactory procedure wherein existing development facilities will be preempted for production testing. This would require utilization of obsolete technology and would require additional trailers to house new employees. Operating economies and efficiencies would be sacrificed.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Explosive component test facility, Mound Facility, Miamisburg, Ohio

2. Project No.: 84-D-120

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 14% of construction costs, item b		$ 2,300
b. Construction costs		16,900
(1) Site preparation, including relocation of roads	$ 200	
(2) Building construction, approximately 28,000 square feet at $140 per square foot	3,900	
(3) Special facilities, including test cells and equipment	12,000	
(4) Other structures, including replacement of small metal buildings and magazines	600	
(5) Utilities	200	
c. Standard equipment		500
Subtotal		19,700
d. Contingency at approximately 12% of above costs		2,200
Total estimated cost		$21,900

11. Method of performance

Design and inspection of the conventional construction work will be performed under a negotiated architect-engineer contract. Design of special facilities will be accomplished by the operating contractor under an existing cost-type contract. Construction of the new building, utilities, and relocation work will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding. Procurement and installation of the special facilities will be accomplished by the operating contractor.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 5,500	$ 7,700	$ 8,700	$ 21,900
Total facility costs	0	5,500	7,700	8,700	21,900

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a/ Based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Explosive component test facility, Mound Facility, Miamisburg, Ohio

2. Project No.: 84-D-120

12. Pending schedule of project funding and other related funding requirements (contd.)

	Prior Years	FY 1984	FY 1985	FY 1986	Total
2. Other project costs					
(a) Conceptual design	50	0	0	0	50
Total other project costs	50	0	0	0	50
Total project costs (items 1 and 2)	$ 50	$ 5,500	$ 7,700	$ 8,700	$ 21,950 a/

b. Other related funding requirements (estimated life of project: 30 years)

1. Facility operating costs	$ 920
Total other related funding requirements	$ 920

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project costs

(a) Conceptual design costs

Approximately $50,000 was required to prepare a conceptual design, preliminary schedule, and cost estimate for this project.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 30 years.

1. Facility operating costs

Facility operating costs of $920,000 are projected. This includes utilities, maintenance, janitorial services, and overhead.

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a/ This total includes $50,000 which is from years prior to FY 1984.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Safeguards and site security upgrade, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-121

3. Date A-E work initiated: 4th Qtr. FY 1979 a/

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $23,425
Less amount for PE&D: 1,425 a/
Net cost estimate: $22,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$10,000	$10,000	$10,000	$ 6,000
1985	12,000	12,000	12,000	10,000
1986	0	0	0	6,000

8. Brief physical description of project

This project will continue the safeguards upgrading of the Rocky Flats Plant. Four major elements of work to be completed under this project include: (1) enclosure of work areas; (2) completion of a new guardpost; (3) installation of personnel loggers for monitoring people passing into and out of enclosed access areas; and (4) installation of SNM measurement equipment for rapid plantwide accountability for the SNM inventory.

An electronic personnel logging system will be installed at the three points where personnel are provided access to enclosed work areas. The personnel logging system will provide electronic identity card readers and electrically controlled turnstiles designed to verify individual area access authorization and to record identity and time and date of entry. The system will log all personnel entries and departures.

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a/ Funds for design of this project were provided under Project 79-8, Plant Engineering and Design, Various Locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-121

8. Brief physical description of project (contd.)

The Rocky Flats Plant SNM measurement capability will be upgraded by this project which will provide nondestructive instrumentation components and systems and improved analytical laboratory equipment. The new SNM measurement system will be installed in six buildings and will be designed specifically for performing nondestructive assays on the types of materials inprocess. The new equipment will furnish a near real-time analysis capability, will permit significant reductions in error limits, and will provide a capability to analyze complex mixtures of radioactive species encountered in processing residues.

The requested FY 1984 funding will be used to complete design of this project, to procure equipment, and initiate construction.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to improve safeguards and security facilities at the Rocky Flats Plant. This project is required to meet the intent of DOE Order 5632.2, Physical Protection of Special Nuclear Materials, and recommendations of the DOE Office of Safeguards and Security.

10. Details of cost estimate a/	Item cost	Total cost
a. Engineering, design, and inspection at approximately 3% of construction, item b		$ 420 b/
b. Construction costs		14,680
(1) Buildings (hardened guard post)	$ 180	
(2) Special facilities, including enclosures, barriers, and personnel loggers	14,260	
(3) Utilities	240	
c. Standard equipment, including SNM measuring equipment		4,000
Subtotal		19,100
d. Contingency at approximately 15% of above costs		2,900
Total estimated cost		$22,000

11. Method of performance

Design and inspection and procurements will be performed by operating contractors. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive bids. The operating contractor will furnish and install selected items of special equipment and will perform minor completion tasks.

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a/ Based on essentially completed Title and I and Title II design.

b/ Excludes $1,425,000 in PE&D funding provided in FY 1979.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Rocky Flats Plant, Golden, Colorado

2. Project No.: 84-D-121

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 6,000	$10,000	$ 6,000	$22,000
(b) PE&D funding	1,425	0	0	0	1,425
Total facility costs	1,425	6,000	10,000	6,000	23,425
2. Other project funding					
(a) Conceptual design	8	0	0	0	8
Total other project funding	8	0	0	0	8
Total project funding (items 1 and 2)	$ 1,433	$ 6,000	$10,000	$ 6,000	$23,433 a/
b. Other related funding requirements (estimated life of project: 15 years)					
1. Facility operating costs					$ 440
Total other related funding requirements					$ 440

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Plant engineering and design

Title I and Title II design for this project was begun using $1,425,000 provided under Project 79-8, Plant Engineering and Design, Various Locations.

2. Conceptual Design

The cost of the conceptual design prepared for this project was $8,000.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be at least 15 years.

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a/ This total includes $1,433,000 from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Rocky Flats Plant, Golden, Colorado
2. Project No.: 84-D-121

13. Narrative explanation of total project funding and other related funding requirements (contd.)

1. Facility operating costs

Annual facility operating costs, estimated at $440,000, will cover the cost of 10 maintenance personnel, 3 technical specialists, utilities, materials, and supplies.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations

2. Project No.: 83-D-124

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $10,000
Date: 1/82

6. Current cost estimate: $10,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$2,000 a/	$2,000 a/	$2,000	$ 600
1984	3,000	3,000	3,000	2,600
1985	5,000	5,000	5,000	3,300
1986	0	0	0	3,500

8. Brief physical description of project

This project will provide building modifications and additional equipment required to produce the SM-2 warhead (W81). Design alternatives, production techniques, and plant workloads influence capital requirements. Current planning indicates that numerous modifications of existing facilities and additional equipment will be required. Following are examples of equipment and facility modifications currently planned for this project. At the Bendix Plant, Kansas City, Missouri, temperature chambers will be provided for testing hard-link switches. Standards and calibration equipment will be provided for producing and testing the fireset and programmer. At the Pinellas Plant, St. Petersburg, Florida, curing ovens will be provided for capacitor production. A hydrogen furnace, a scanning electron microscope, and miscellaneous minor equipment will be provided for neutron generator production. At the Pantex Plant, Amarillo, Texas, process and inspection equipment will be provided for use in fabricating high explosives and for final weapons assembly operations. An accelerated aging unit and test system will be built for use on assembled weapons. Requirements for the Mound Facility, Miamisburg, Ohio, include installation of an infrared laser and focusing system, laser welder, and positioner. Volume measuring equipment and an environmental test chamber will be built for use in production of detonators and cable assemblies. The Rocky Flats Plant, Golden, Colorado, will be provided with a numerically controlled ultrasonic scanner, endoscope, and additional equipment for use.

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a/ Based on Continuing Resolution, Public Law 97-377. Project cost estimate, funding requirements, and schedule may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations

2. Project No.: 83-D-124

8. Brief physical description of project (contd.)

Additional equipment will be provided for production of the weapon pit. The Y-12 Plant, Oak Ridge, Tennessee, requires two additional computer numercially controlled turning machines and a multihead electrical discharge machine. A large caster for uranium alloy components will be modified.

Weapon design decisions which affect production facility requirements have been made. During the ongoing full-scale development process, allowances included in the initial cost estimate for facility design uncertainties have been apportioned to cover the necessary construction and equipment procurement.

The requested FY 1984 funding will continue construction of production facilities.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity for the SM-2 warhead.

Maximum use will be made of existing manufacturing facilities; however, unique features of the warhead will require capabilities not currently available in the production plants. The additional number of parts added to the current production workload will require additional production capacity.

The SM-2 is a Navy missile with fleet defense as its primary role. Design work is currently in process for upgraded versions of the existing missiles. The W81 warhead will provide nuclear capability for the SM-2. Agreement was reached in September 1977 with the Department of Defense (DOD) to proceed with Phase 3 development engineering activities.

10. Details of cost estimate a/

	Total cost
a. Engineering, design, and inspection at approximately 15% of construction costs, item b	$ 180
b. Construction costs	1,100
c. Standard equipment	7,550
Subtotal	8,830
d. Contingency at approximately 11% of above costs	1,170
Total estimated cost	$10,000

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations
2. Project No.: 83-D-124

10. Details of cost estimate (contd.)

Estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 2,300
Pinellas Plant, St. Petersburg, Florida	450
Pantex Plant, Amarillo, Texas	700
Mound Facility, Miamisburg, Ohio	1,300
Rocky Flats Plant, Golden, Colorado	2,200
Y-12 Plant, Oak Ridge, Tennessee	3,050
Total	$10,000

11. Method of performance

Design and inspection will be performed primarily by the operating contractors and, where feasible, under negotiated architect-engineer contracts. Equipment procurement, inspection, and installation will be performed by operating contractors.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 600	$ 2,600	$ 3,300	$ 3,500	$10,000
Total facility costs	600	2,600	3,300	3,500	10,000
2. Other project funding					
(a) Conceptual design	36	0	0	0	36
Total other project funding	36	0	0	0	36
Total project funding (items 1 and 2)	$ 636	$ 2,600	$ 3,300	$ 3,500	$10,036 a/

b. Other related funding requirements (estimated life of project: 10 years)

1. Facility operating costs	$ 50
2. Programmatic operating expenses directly related to the facilities	360
Total other related funding requirements	$ 410

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a/ This total includes $636,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations

2. Project No.: 83-D-124

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design costs of about $36,000 have been incurred in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of these facilities will be at least 10 years.

1. Facility operating costs include utilities, maintenance, and janitorial services.
2. Programmatic operating expenses include direct labor, materials and supplies, procurement and fabrication of tooling, and overhead.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: SENTRY warhead production facilities, various locations

2. Project No.: 83-D-134

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: $97,600
Date: 3/82

6. Current cost estimate: $72,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 0 a/	$ 0 a/	$ 0	$ 0
1984	16,300	16,300	16,300	6,700
1985	40,400	40,400	40,400	25,000
1986	15,300	15,300	15,300	36,000
1987	0	0	0	4,300

8. Brief physical description of project

This project provides production facilities for a nuclear warhead for the SENTRY system, initially called the Low Altitude Defense (LoAD) System. It includes new buildings, building modifications, special facilities, and equipment.

Planning for this project is based upon an ongoing Phase 2 Feasibility Study for the SENTRY system which was joined in by this agency and the Department of Defense (DOD) on February 17, 1981. Although design and production methods have been planned, currently planned special facilities and the planned building construction may require nominal changes in the future.

Three new buildings will be provided. At the Y-12 Plant, a building of approximately 10,000 square feet will be built. At the Pinellas Plant, requirements for additional manufacturing space will be provided by a new building of approximately 10,000 square feet. An 8,000-square-foot building will be built at the Mound Facility to house an automated continuous chemical process system for production of the detonator system.

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a/ Based on Continuing Resolution, Public Law 97-377. Project cost estimate, funding requirements, and schedule may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: SENTRY warhead production facilities, various locations   2. Project No.: 83-D-134

8. Brief physical description of project (contd.)

Modifications to existing buildings and special facilities will be provided to meet requirements for additional production capacity and for new capabilities of the production plants. Additional equipment requirements will be provided at six production plants, of which approximately 18 percent will be new capabilities. Following are some examples of equipment and special facilities that are currently planned for this project: (1) polar coordinate measuring facility; (2) annealing furnaces; (3) accelerated aging facility; (4) lathes, milling machines, and other metal working equipment; (5) microelectronics production facilities; (6) calibration and analytic equipment; (7) certification equipment; and (8) standard equipment to increase production capacity and capability. These are subject to change with progress in full-scale development engineering.

Required utility services will include water, steam, and electricity which will involve improvement of and extensions to existing utility systems.

The initial cost estimate for this project has been reduced from $97,600,000 to $72,000,000 as a result of overall workload changes which permitted elimination of a 50,000-square-foot uranium machining building and associated equipment at the Y-12 Plant.

The requested FY 1984 funding will be used for design of new buildings, building modifications, and utility services. It will also initiate procurement of long-lead equipment requirements.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide increased capacity and new capability in the existing weapons production plants needed to produce new nuclear warheads for the SENTRY system.

Maximum use will be made of existing manufacturing facilities in preparing for the SENTRY production program. Unique features of the new warhead will require capabilities not currently available in the production plants. Additional operating space, production facilities, and equipment will be required to produce the additional parts.

It is anticipated that this agency and the Department of Defense (DOD) will reach an agreement to proceed with full-scale development engineering (Phase 3) for this system during FY 1983 in order that the DOD schedule can be met. Plans for the construction project presented here are based upon agency workload planning guidance of September 1981.

Major design and process uncertainties are known at this time which will be resolved as development engineering proceeds. An allowance of $14,800,000 has been made in the current cost estimate to cover uncertainties.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: SENTRY warhead production facilities, various locations

2. Project No.: 83-D-134

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 20% of construction costs, item b		$ 5,620
b. Construction costs		28,580
(1) Improvements to land, including grading, leveling, and paving	$ 240	
(2) New buildings, approximately 28,000 square feet at about $208 per square foot	5,830	
(3) Utilities	50	
(4) Special facilities	22,460	
c. Standard equipment, including lathes, furnaces, calibration, and testing equipment		15,750
Subtotal		49,950
d. Contingency at approximately 14% of above costs		7,250
e. Design uncertainties		14,800
Total estimated cost		$72,000

The estimates by location are as follows:

Y-12 Plant, Oak Ridge, Tennessee	$25,000
Bendix Plant, Kansas City, Missouri	1,500
Mound Facility, Miamisburg, Ohio	11,400
Rocky Flats Plant, Golden, Colorado	11,300
Pantex Plant, Amarillo, Texas	1,000
Pinellas Plant, St. Petersburg, Florida	6,000
Savannah River Plant, Aiken, South Carolina	1,000
Uncertainties	14,800
	$72,000

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Estimate based upon preliminary warhead design information and feasibility study in progress.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: SENTRY warhead production facilities, various locations
2. Project No.: 83-D-134

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 6,700	$25,000	$36,000	$ 4,300	$72,000
Total facility costs	0	6,700	25,000	36,000	4,300	72,000
2. Other project funding						
(a) Conceptual design	75	0	0	0	0	75
Total other project funding	75	0	0	0	0	75
Total project funding (items 1 and 2)	$ 75	$ 6,700	$25,000	$36,000	$ 4,300	$72,075 a/

b. Other related funding requirements (estimated life of project: 5 years)

1. Facility operating costs	$ 2,400
2. Programmatic operating expenses directly related to the facility	11,000
Total other related funding requirements	$13,400

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design costs of approximately $75,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of these facilities will be at least five years.

1. Facility operating costs

Approximately $2,400,000 per year will be spent to cover the cost of utilities, maintenance, janitorial services, and related overhead costs for the new warhead production facilities.

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a/ This total includes $75,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	SENTRY warhead production facilities, various locations	2. Project No.: 83-D-134

13. Narrative explanation of total project funding and other related funding requirements (contd.)

2. Programmatic operating expenses directly related to the facility

The annual cost of direct labor, materials and supplies, tooling procurement, tooling fabrication, and overhead is estimated at $11,000,000 per year while operating at full production.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1988

5.	Previous cost estimate:	$ 983,000
	Less prior projects:	211,000
	Net cost estimate:	772,000
	Date: 1/82	
6.	Current cost estimate:	$1,036,000
	Less prior projects:	211,000
	Net cost estimate:	825,000 a/
	Date: 1/83	

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 87,500	$ 66,000	$ 65,899	$ 18,487
1983	132,900 b/	154,400 b/	154,501 b/	71,550
1984	229,200	229,200	229,200	123,800
1985	209,500	209,500	209,500	227,803
1986	165,900	165,900	165,900	204,360
1987	0	0	0	129,200
1988	0	0	0	49,800

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a/ The total project cost is estimated at $1,036,000,000 in FY 1984 dollars. Other restoration projects have been initiated which collectively have an estimated cost of $211,000,000 (FY 1980 RD&T capital equipment, Project Nos. 79-7-n, 80-AE-6, 81-D-107, and 81-D-116). Therefore, the total estimated cost of this line item project is $825,000,000 in FY 1984 dollars. The total estimated cost assumes that adequate capital equipment and general plant projects funding will be received in FY 1983 and future years to prevent the further deterioration of equipment and utilities in the nuclear weapons complex.

b/ Based on Continuing Resolution, Public Law 97-377. Project cost estimates, funding requirements, and schedules may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

8. Brief physical description of project

This project is a continuation of a multiyear program for restoration of utilities and capital equipment at the seven weapon production plants, the three weapons laboratories, and the Nevada Test Site. The project will provide for replacement of utilities and equipment that, in progressing at their normal life cycle, have deteriorated to the point that their physical condition is poor or is no longer technologically satisfactory. Appraisals of the physical condition and technological adequacy of utilities and equipment in use in the nuclear weapons production, research, development, and testing complex have been completed and the complex has identified poor and inadequate items that should be replaced. These utilities and equipment require correction due to (a) consistent substandard performance, (b) excessive maintenance costs, (c) continually threatening scheduled operations by breakdown, and (d) not being fully capable of meeting program requirements or performing at required confidence levels. These restoration efforts will be accomplished at the Y-12 Plant, Rocky Flats Plant, Bendix Plant, Mound Facility, Pantex Plant, Savannah River Plant, Pinellas Plant, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, and the Nevada Test Site.

The FY 1984 funding requested is $229,200,000; $148,000,000 will be used to continue design, procurement, and construction of utilities and equipment at the weapons production complex; $57,200,000 will be used to continue design, procurement, and construction of the critical utilities and equipment at the three weapons laboratories; and the remaining $24,000,000 will be used for restoration efforts at the Nevada Test Site.

9. Purpose, justification of need for, and scope of project

The agency is responsible for the production and lifetime surveillance of safe and reliable nuclear weapons in support of United States national security. Thus, it is the mission of weapons production to provide for: (1) manufacturing capabilities and capacities required for the production of nuclear warheads, projectiles, and bombs approved by the President and planned for future enhancement of United States nuclear forces; (2) the surveillance and certification of the technical quality of nuclear weapons in the existing stockpile; (3) the provisioning of limited-life components; and (4) reviewing jointly with the Department of Defense (DOD) the safety of operating and handling procedures. During the 1980's, the annual workload for this mission is greater than the workload experienced in the late 1970's.

The primary missions of the DOE's nuclear weapons research, development, and testing are: (1) to sustain international leadership in new ideas and technologies essential to maintain modern nuclear forces capable of responding to threats against the United States national security; and (2) to design, develop, and certify nuclear weapons approved by the President for DOD delivery systems.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

9. Purpose, justification of need for, and scope of project (contd.)

Concern has developed at the Office of Military Application and field operations offices over the past few years that the nuclear weapons production, laboratory, and testing facilities have deteriorated. Further, the deterioration of the laboratory and testing facilities increases the risk of diminishing the United States superiority in nuclear weapons technology.

During calendar years 1977 and 1978, members and staff of the Senate Armed Services Committee (SASC) and the House Armed Services Committee (HASC) made extensive visits to nuclear weapons production, research, development, and testing facilities. They recognized a deficiency in production facilities and the research and development laboratories that has built up over the years. It was observed further that, while this problem was acknowledged, there was no comprehensive program designed to systematically alleviate the problem. Chairman Price of the HASC, in a letter to Dr. Schlesinger on January 6, 1978, requested further information on existing studies, budget history, estimated total cost to replace obsolete equipment and utilities, a reasonable estimate for replacement costs, and DOE plans to restore such deficiencies. A SASC staff member's report to Chairman Stennis on his inspection of DOE weapons facilities was instrumental in the FY 1979 authorizing legislation requirement that the Secretary of Energy conduct a study of the status of all Government-owned, contractor-operated plant, capital equipment, facilities, and utilities which support the United States nuclear weapons program and submit the result of such study to the Congress at the same time the DOE authorization request for FY 1980 is submitted to the Congress.

Recognizing that a problem existed, a study was initiated in early CY 1977 to determine the extent of deterioration of equipment and utilities at the nuclear weapons production plants prior to the increased workload expected in the 1980-87 time period. The results were issued in a report dated November 1, 1977, entitled "An Appraisal of Physical Condition and Technology Status of Equipment and Utilities Systems in the Weapons Production Complex." This appraisal formed the basis for determining an estimate of $300,000,000 to be the net accumulated degradation in FY 1980 in the production and surveillance complex.

In December 1977, a similar appraisal was initiated to determine the status of equipment and utilities at the nuclear weapons laboratories and the Nevada Test Site. The research, development, and testing study concluded that the cost of equipment and utilities which needs replacement to assure an efficient and capable complex to perform nuclear weapons research, development, and testing amounted to approximately $295,000,000 in FY 1980 dollars. Thus, the total estimate of upgrading the whole weapons complex was stated as $595,000,000 in FY 1980 dollars. Subsequent to these appraisals, the agency Controller was tasked to conduct an independent assessment of the appraisals. This assessment primarily

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

9. Purpose, justification of need for, and scope of project (contd.)

concluded that: (1) degradation in the weapons complex exists.,(2) the appraisal method is technically sound, (3) some of the samples contained excess equipment that should have been purged prior to determining the estimated cost of replacement, and (4) the replacement cost was used when less costly alternatives existed for upgrading the capability. The Controller's estimate, based on these findings, is $451,000,000.

On January 25, 1979, the Assistant Secretary for Defense Programs provided a report to the Congress on the results of the studies. As part of this study, the DOE is proposing to undertake the correction of these deficiencies with a multifaceted program over the next several years. This will include: (a) annual appraisals of the technical and physical status of the United States nuclear weapons capability and the progress being made to correct the existing deficiencies, (b) improving the precision of the appraisal techniques, and (c) developing annual funding requirements through the normal budgetary procedures as part of a multiyear restoration program.

The second appraisals of the nuclear weapons complex indicated that the condition of the complex continued to deteriorate and that the accumulated degradation had grown to $790,000,000 in FY 1981 dollars. This increase over the previous estimate was caused primarily by four factors: (1) engineering-type estimates for repair or replacement costs were used rather than estimates based on Bureau of Labor Statistics escalation indices; (2) inclusion of the appraisal of interior building services at all sites; (3) an additional year's degradation from the previous appraisal; and (4) an additional year's escalation on the restoration costs for those items found to be physically poor or technologically inadequate. As was done for the first appraisal, the Controller conducted an independent assessment of the appraisals. The Controller's assessment once again verified the degradation in the weapons complex and that the relative growth in the estimate was justified. However, the Controller's estimate for the accumulated degradation was $674,000,000 in FY 1981 dollars.

Three appraisals have now been completed and indicate the problem has grown to $969,000,000 in FY 1982 dollars. Although the Controller's office has not conducted a third independent assessment, a comparable estimate of $847,000,000 was developed utilizing the results of the Controller's second assessment; estimating the amount of additional deterioration, including the higher escalation rates being experienced; and expressing this estimate in FY 1982 dollars. Allowing for the additional deterioration continuing to be experienced due to the continuing underfunding of capital equipment and general plant projects and expressing the Controller's estimate in FY 1984 dollars, yields a current estimate of $1,036,000,000. The agency now proposes a seven-year program for the correction of the identified $1,036,000,000 in deficiencies and the funding requested for this project is a part of that program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

10. Details of cost estimate a/

	Total cost
a. Engineering, design, and inspection	
b. Construction costs	
(1) Building modifications	
(2) Special facilities	
(3) Utilities	
c. Standard equipment	$825,000
d. Removal cost less salvage	
e. Contingency	
Total estimated cost	$825,000 b/

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$90,037	$123,800	$227,803	$204,360	$129,200	$ 49,800	$825,000
Total facility costs	90,037	123,800	227,803	204,360	129,200	49,800	825,000
2. Other project funding							
(a) Conceptual design	2,111	850	350	0	0	0	3,311
(b) Other project related costs	100	150	150	150	100	0	650
Total other project funding	2,211	1,000	500	150	100	0	3,961
Total project funding (item 1 and item 2)	$92,248	$124,800	$228,303	$204,510	$129,300	$ 49,800	$828,961 c/

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a/ Based on completed third appraisal and Controller's second assessment.

b/ Excludes prior-year projects estimated at $211,000,000.

c/ This total includes $92,248,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
  1. Total facility costs
    (a) Construction line item

      Total excludes prior-year projects estimated at $211,000,000.

  2. Other project funding
    (a) Conceptual design

      Conceptual design cost of $3,311,000 is necessary to develop a budget quality cost estimate and construction schedule.

    (b) Other project related costs

      $650,000 is required for Rocky Flats' subprojects for health physics monitoring.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $52,300
Date: 1/82

6. Current cost estimate: $52,300
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$15,000	$ 9,500	$ 7,500	$ 864
1983	27,800 a/	33,300 a/	35,300	13,800
1984	4,000	4,000	4,000	21,700
1985	5,500	5,500	5,500	11,700
1986	0	0	0	4,236

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

8. Brief physical description of project

This project provides for design and construction of additional production capability and capacity required to produce parts for selected existing weapons system and for disassembly, assembly, inspection, and recertification. The construction consists primarily of additional equipment, modification of existing buildings, and new facilities.

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a/ Based on Continuing Resolution, Public Law 97-377. Project cost estimate, funding requirements and schedule may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

8. Brief physical description of project (contd.)

At the Bendix Plant, Kansas City, Missouri, approximately 18,000 square feet of the existing main manufacturing building will be modified. The existing Solid Film Application Facility will be expanded. Additional manufacturing and certification equipment will be installed and some existing equipment will be relocated in order to expand production capacity, particularly in metal machining, electrical products, electronics, and cable manufacturing. Examples of the types of equipment to be provided include milling machines, checker lathes, laser weld assembly equipment, temperature test chambers, and a 100-ton press.

Additional production capacity to be provided at the Y-12 Plant, Oak Ridge, Tennessee, will include procurement and installation of three numerically controlled turning machines.

The existing facilities at the Pinellas Plant, St. Petersburg, Florida, will be expanded and partially reoriented to accommodate the stockpile improvement program. A warehouse of approximately 10,300 square feet will be built for classified storage, in order to release production floor space currently in use for storage. The building will be of concrete masonry construction having a concrete floor slab ongrade and structural steel framing. New equipment to be installed includes numerically controlled lathes and drills.

New weapons assembly facilities are required at the Pantex Plant, Amarillo, Texas. This project will provide one assembly cell, nine assembly bays, and associated support facilities. These facilities will consist of about 36,000 square feet of reinforced concrete structures. The support facilities will include mechanical rooms, inert parts and tool staging spaces, decontamination areas, and restrooms. Equipment to be provided and installed consists of process, certification, and testing equipment required for additional capacity in pressing, machining, and assembly activities.

Additional capacity at the Rocky Flats Plant, Golden, Colorado, will be obtained by modifying existing buildings to accommodate new equipment for plutonium processing. A new casting furnace, a transfer conveyor, a new electron beam welder, and an numerically controlled lathe will be installed.

This project includes provision for additional production capacity associated with uncertainties in the production process. The process uncertainties allowance will provide additional multiaxis machining capability and expansion of the electrical production area at the Bendix Plant if anticipated production yields cannot be achieved.

Required utility services at all plants will be extended from existing building services.

The requested FY 1984 funding will continue construction and procurement of equipment for this project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

9. Purpose, justification of need for, and scope of project

The purpose of this project is to establish additional capacity in the weapons manufacturing complex to support the weapons stockpile improvement program.

The stockpile improvement program will extend over the next several years during a period of high production at the weapons production facilities. Therefore, additional capacity will be required to avoid interference with the production of new weapon systems. The improvement process will include manufacturing of new or redesigned weapon parts and exchange of these parts in the weapon. Some modifications will require substantial disassembly, reassembly, and recertification; this work would be accomplished in the new assembly facilities to be built at the Pantex Plant.

The goal of stockpile improvement is to improve overall safety and security of the current nuclear weapon systems. Plans have been formulated to adjust the stockpile and avoid constraints or reduction in the deterrent value of the stockpile. The presently projected nuclear stockpile improvement program was evaluated on a weapon-by-weapon basis. The initial effort will be limited to a prudent minimum number of weapons. The construction and equipment that will be provided by this project are required to support improvement of the selected weapon systems. If, at a later time, additional weapons systems are included in the stockpile improvement program, additional facilities will be required.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 14% of construction costs, item b		$ 3,800
b. Construction costs		27,700
(1) Reinforced concrete and earth-covered structures, approximately 36,000 square feet at about $655 per square foot	$23,700	
(2) Building additions, modifications, and conveyor system	4,000	
c. Standard equipment, including lathes, metal saws, milling machines, and various production, assembly, and inspection equipment		10,900
Subtotal		42,400
d. Contingency at approximately 15% of above costs		6,500
e. Process uncertainties		3,400
Total estimated cost .		$52,300

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a/ Estimate based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations   2. Project No.: 82-D-108

10. Details of cost estimate (contd.)

The estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 7,800
Y-12 Plant, Oak Ridge, Tennessee	2,900
Pantex Plant, Amarillo, Texas	32,300
Rocky Flats Plant, Golden, Colorado	3,100
Pinellas Plant, St. Petersburg, Florida	2,800
Uncertainties	3,400
Total	$52,300

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$14,664	$21,700	$11,700	$ 4,236	$52,300
Total facility costs	14,664	21,700	11,700	4,236	52,300
2. Other project funding					
(a) Conceptual design	115	0	0	0	115
Total other project funding	115	0	0	0	115
Total project funding (items 1 and 2)	$14,779	$21,700	$11,700	$ 4,236	$52,415 a/

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 190
2. Programmatic operating expenses directly related to these facilities	$ 1,605
Total other related funding requirements	$ 1,795

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a/ This total includes $14,779,000 from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

13. Narrative explanation of total project funding and other related funding requirements

    a. Total project funding

        1. Other project funding

            Conceptual design was prepared for this project at an estimated cost of $115,000 for all sites.

    b. Other related funding requirement

        1. Facility operating costs

            Annual facility operating costs estimated at $190,000 include maintenance, janitorial, and utility services.

        2. Programmatic operating costs

            Programmatic operating costs estimated at $1,605,000 annually will cover the manpower necessary to operate the additional facilities.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations

2. Project No.: 82-D-109

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $65,000
Date: 3/82

6. Current cost estimate: $65,000
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$35,000	$15,000	$14,850	$ 1,726
1983	0 a/	0 a/	150	5,940
1984	0	2,500	2,500	6,360
1985	30,000	47,500	47,500	11,760
1986	0	0	0	18,080
1987	0	0	0	17,060
1988	0	0	0	4,074

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

8. Brief physical description of project

This project will provide additional equipment, building modifications, and special facilities needed for production and certification of components, subassemblies, and final assembly of the W82 warhead for the new 155mm AFAP.

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a/ Based on Continuing Resolution, Public Law 97-377. Project cost estimate, funding requirements, and schedule may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations
2. Project No.: 82-D-109

8. Brief physical description of project (contd.)

Production of the new 155mm AFAP requires revised or expanded capabilities at the various production plants. Following are examples of equipment and facility modifications that are expected to be provided under this project: (1) equipment for manufacturing the high strength projectile case and nuclear components; (2) equipment for grinding, joining, and plating projectile components; (3) facilities for fabrication and assembly, inspection, testing, and certification of projectile component subassemblies and final assemblies; (4) minor building additions for housing environmental and testing equipment; and (5) building modifications necessary to accommodate new equipment and process installations.

Utilities will be provided by extension of existing services within existing buildings.

The requested FY 1984 funding will continue construction.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity needed for the W82 warhead.

Maximum use will be made of existing manufacturing capabilities and capacities in preparing for production of the 155mm AFAP. However, unique features of the new weapon will require capabilities not currently available in the production plants. The additional number of parts added to the production workload will require additional capacity at the production plants.

The new 155mm AFAP will be designed with improved firing characteristics and extended range and will replace the existing W48 projectile. This agency and the Department of Defense (DOD) agreed to Phase 3 development engineering activities in February 1978.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 20% of construction costs, item b		$ 6,000
b. Construction costs		34,000
(1) Special facilities	$34,000	
c. Standard equipment		13,000
Subtotal		53,000
d. Contingency at approximately 15% of above costs		8,000
e. Production process uncertainties		4,000
Total estimated cost		$65,000

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations
2. Project No.: 82-D-109

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 7,666	$ 6,360	$11,760	$18,080	$17,060	$ 4,074	$65,000
Total facility cost	7,666	6,360	11,760	18,080	17,060	4,074	65,000
2. Other project funding							
(a) Conceptual design	120	0	0	0	0	0	120
Total other project funding	120	0	0	0	0	0	120
Total project funding (items 1 and 2)	$ 7,786	$ 6,360	$11,760	$18,080	$17,060	$ 4,074	$65,120 a/

b. Other related funding requirements (estimated life of project: 10 years)

1. Facility operating costs	$ 3,500
2. Programmatic operating expenses directly related to the facility	11,650
Total other related annual funding requirements	$15,150

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design costs of approximately $120,000 were incurred in the process of developing and improving the project cost estimate and schedule.

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a/ This includes $7,786,000 which is from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations	2. Project No.: 82-D-109

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 10 years.

1. Facility operating costs

Facility operating costs of approximately $3,500,000 per year are projected to cover the costs of utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility

Programmatic operating costs of approximately $11,650,000 per year are projected to cover direct labor, material and supplies, tooling procurement, tooling fabrication, and related overhead.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Interactive graphics systems, various locations

2. Project No.: 82-D-111

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $30,600
Date: 1/82

6. Current cost estimate: $30,600
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 9,000	$ 0	$ 0	$ 0
1983	0 a/	6,000 a/	6,000	3,900
1984	15,600	18,600	18,600	17,900
1985	6,000	6,000	6,000	6,700
1986	0	0	0	2,100

8. Brief physical description of project

This project will provide an interactive graphics network for computer-aided design and computer-aided manufacturing activities in six weapons production plants. The project will involve modification of existing factory space and procurement and installation of standard equipment.

Construction at Bendix Plant will involve modification of approximately 12,000 square feet of existing building space to accommodate secure establishment of an interactive graphics system throughout the plant. Space will be prepared for installation of a graphics processor and mass storage unit. Construction will include a raised floor, new heating, ventilation and air conditioning system, security provisions, modifications to lighting systems, and sprinkler systems. Approximately 57 graphic work stations will be located in the existing plant area. These will operate in the existing environment. Standard equipment to be procured and installed will include 2 mainframe computers, approximately 8 disc drives, 2 plotters, and equipment necessary to establish approximately 57 design/edit graphics work stations and about 90 factory

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a/ Based on Continuing Resolution, Public Law 97-377. Project cost estimate, funding requirements, and schedule may require adjustments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics systems, various locations

2. Project No.: 82-D-111

8. Brief physical description of project (contd.)

graphics view/takeoff stations. A secure telecommunication network will link the data processors, the graphics stations, and the Secure Automatic Communications Network (SACNET) by which data are transferred among weapon production plants.

At the Pinellas Plant, existing building space will be modified to accommodate an interactive graphics system. Construction will involve upgrading space for computer equipment and will include: raised floor; additional heating, ventilating, and air conditioning; and electronic security measures. Approximately 14 interactive graphics work stations will be established throughout the plant work areas. Equipment to be procured and installed includes hardware for computer enhancement, approximately 2 disk drives, 4 minicomputers, approximately 22 microprocessors, 2 plotters, and equipment to be installed at the graphic work stations. A secure telecommunication network will connect the elements of the interactive graphics system and the SACNET.

At the Pantex Plant, existing space will be modified to accommodate a minicomputer and approximately 18 interactive graphics system work stations located throughout the plant. Equipment to be procured and installed will include 1 minicomputer, 1 microprocessor, and approximately 18 design/edit graphics work stations. Secure telecommunications cabling will be provided to connect the in-plant interactive graphics system network and to link with the SACNET.

At the Mound Facility, approximately 5,000 square feet of building addition will be built to accommodate the central interactive graphics data processing equipment. This will include improvements in heating, ventilating, and air conditioning and lighting. Equipment to be procured and installed will include 1 disc drive, 2 minicomputers, 2 plotters, and interactive graphics system work station design/edit equipment sufficient to establish approximately 16 work stations. Installation of the interactive graphics system will include secure cabling and a link with the local plant SACNET terminal.

Construction at the Rocky Flats Plant will include modification of space in 6 separate buildings to accommodate installation of approximately 12 design/edit work stations. Equipment to be procured and installed in the Rocky Flats interactive graphics system includes 2 disc drives, plotters, and the necessary elements of design/ edit equipment for the interactive graphics system work stations. A secure telecommunication network will link the interactive graphics system and the Rocky Flats SACNET terminal.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics systems, various locations
2. Project No.: 82-D-111

8. Brief physical description of project (contd.)

At the Y-12 Plant, construction will include building modifications and an extensive secure telecommunications trunk to link interactive graphics system equipment in various existing factory buildings. Standard equipment to be procured and installed at the Y-12 Plant includes 2 mainframe computers, approximately 4 disc drives, and work station equipment for approximately 220 design/edit stations and approximately 33 view/takeoff stations. Four plotters are planned for this system. Secure cabling will connect this interactive graphics system network to the Y-12 Plant SACNET terminal.

A total of 20,200 square feet of space will be prepared for installation of interactive graphics data processing equipment. This includes 15,200 square feet of modified building space. The cost of building modifications includes the cost of relocating present occupants and equipment, plus the cost of telecommunication lines installed to link the interactive graphics systems.

It is anticipated that most equipment will be "off-the-shelf" items. Integrating the equipment and siting within existing buildings will require engineering and specification preparation effort exceeding that normally required for procurement and installation of standard equipment.

The requested FY 1984 funding will be used for procurement of equipment and for start of construction.

9. Purpose, justification of need for, and scope of project

Workload increases require an increase in engineering personnel to work in design drafting, tool and gage design, preparation of product and process designs, automated production machining control, and other graphics operations. The interactive graphics system provided by this project will significantly reduce manpower requirements for this projected workload, will increase productivity of the combined weapons production complex, and can produce substantial cost savings. Some commercial manufacturing activities have experienced production increases in the range of 4-1 to 10-1. Experience with limited interactive graphics equipment at the Pantex Plant has shown a productivity increase of 2-1 in the preparation of control tapes for automated metal turning machines. This savings involved a reduction of effort required to prepare the machine control tapes and included a savings in machine time and a reduction of materials normally lost as rejected parts.

The interactive graphics system to be installed in the individual production plants will allow direct exchange of design information with other production plants and, ultimately, with the weapons design laboratories. The system will be used for tool and gage design, printed circuit board design, numerical control part programming, facilities engineering, and product engineering. Completion of this project will be a major step toward achieving full economies of factory automation.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics systems, various locations

2. Project No.: 82-D-111

9. Purpose, justification of need for, and scope of project (contd.)

The interactive graphics network is expected to increase productivity by more efficiently creating, revising, storing, and distributing graphics documents required in the weapon component production process. Three major benefits expected for the weapons production process include reduced production time, reduced preproduction time, and better capability to restart production.

Experience on a pilot interactive graphics system at the Pantex Plant has shown the programming work for numerically controlled production machines is accomplished on interactive graphics system 2.6 times faster than with previous manual methods. A programming error results in lost machine time, operator time, and material. An 18-month process development project at the Bendix Plant concluded that in those areas of Bendix manufacturing studied, benefit-to-cost ratios expected from interactive graphics system networks ranged from 2-1 to 5-1. Potential savings in time and cost at all weapons production plants motivates the installation of the interactive graphics system. American private industry has now begun conversion to these systems in many areas because of the reduction in design effort and manufacturing costs that can be achieved. The interactive graphics system offers productivity gains for a broad class of industrial design and manufacturing applications.

Use of interactive graphics in the preproduction phase of introducing new components into production is expected to reduce the number of changes or iterations in all preproduction activities.

Design and production data for weapon systems will be retained as mass storage equipment which will be part of the interactive graphics system. Provision will be made for rapid retrieval of these data so that an existing weapon system can be reintroduced into production or modified at some future date.

The hiring and retention of skilled labor is becoming increasingly difficult in the weapons production complex. An interactive graphics system capability will significantly reduce the number of skilled personnel that must be recruited and processed for security clearances to meet increasing production workloads. Delay of this project will result in little or no relief from the hiring problems and will preclude achievement of productivity improvements.

The incremental operating cost for this project in the first year will be about $3,000,000. Use of the interactive graphics system by manufacturing plant personnel at their work stations throughout the plant will result in reduced recruitment of plant employees. The incremental operating cost for the system is primarily for system maintenance contracts, supplies, and materials.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics systems, various locations

2. Project No.: 82-D-111

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 14% of construction costs and 7% of standard equipment costs		$ 2,360
b. Construction costs		8,240
(1) Building modifications, approximately 30,000 square feet at about $164 per square foot	$ 4,910	
(2) Secure communications system at Y-12 and Rocky Flats Plants	3,330	
c. Standard equipment (such as graphics processors, data storage systems, computers), including installation costs		16,990
d. Software - purchase and modification		490
Subtotal		28,080
e. Contingency at approximately 9% of costs		2,520
Total estimated cost		$30,600

Estimates by locations are as follows:

Bendix Plant, Kansas City, Missouri	$ 9,100
Pinellas Plant, St. Petersburg, Florida	3,000
Pantex Plant, Amarillo, Texas	1,500
Mound Facility, Miamisburg, Ohio	4,200
Rocky Flats Plant, Golden, Colorado	4,200
Y-12 Plant, Oak Ridge, Tennessee	8,600
Total	30,600

11. Method of performance

Design and engineering of the facilities will be performed under a negotiated architect-engineer contract. Construction, procurement of standard equipment, and installation of equipment will be accomplished by fixed-price contracts awarded on the basis of competitive bids. Purchase of software and services will be administered by the operating contractors on the basis of competitive bids.

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a/ Estimate based on completed conceptual designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics systems, various locations

2. Project No.: 82-D-111

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 3,900	$17,900	$ 6,700	$2,100	$30,600
Total facility costs	3,900	17,900	6,700	2,100	30,600
2. Other project funding					
(a) Conceptual design	100	0	0	0	100
Total other project funding	100	0	0	0	100
Total project funding (items 1 and 2)	$ 4,000	$17,900	$ 6,700	$2,100	$30,700 a/

b. Other related funding requirements (estimated life of project: 15 years)

1. Facility operating costs	$ 3,000
Total other related funding requirements	$ 3,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

The estimated cost for completing the conceptual design for this project is $100,000.

b. Other related funding requirements

It is estimated that the programmatic life of these facilities will be at least 15 years.

1. Facility operating costs

Facility operating costs include utilities, janitorial services, maintenance, and related materials and supplies.

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a/ This total includes $4,000,000 which is from years prior to FY 1984.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

3. Date A-E work initiated: 2nd Qtr. FY 1982 a/

5. Previous cost estimate: $72,475
Date: 1/82

3a. Date physical construction starts: 2nd Qtr. FY 1982

6. Current cost estimate: $72,475
Less amount for PE&D: 275 a/
Net cost estimate: $72,200
Date: 1/83

4. Date construction ends: 1st Qtr. FY 1987

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 8,000	$ 8,000	$ 7,991	$ 1,211
1983	40,000 b/	40,000 b/	40,009	10,800
1984	14,200	14,200	14,200	19,600
1985	10,000	10,000	10,000	23,100
1986	0	0	0	13,000
1987	0	0	0	4,489

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

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a/ FY 1979 Plant Engineering and Design funding was utilized for Consolidated Materials Laboratories, Kansas City (Bendix) Plant ($175,000) and Upgrade Weapons Staging Area Roads, Pantex Plant ($100,000).

b/ Based on Continuing Resolution, Public Law 97-377. Project cost estimate, funding requirements, and schedule may require adjustment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

8. Brief physical description of project

This project provides for new buildings, building modifications, site and facility improvements, and equipment and furnishings at the Kansas City (Bendix), Pantex, Mound, Rocky Flats, and Y-12 locations necessary to increase or enhance weapons production and production support capability and capacity. Each subproject is described briefly below:

Kansas City (Bendix) Plant

Consolidated Materials Laboratories - TEC $7,300,000

This subproject consists of remodeling and upgrading existing materials laboratory facilities and improving space adjacent to the existing laboratory facilities for the relocation and consolidation of numerous other laboratory operations. The consolidated facilities will occupy a total area of slightly more than 25,000 square feet.

Construction features will include ordinary hazard sprinkler systems, liquid waste systems, and utility services (including hot and cold water, chilled water for cooling, steam, dry gaseous nitrogen, compressed air, natural gas, and electrical power). New equipment, including exhaust hoods and blowers and laboratory benches, sinks, and cabinetry, will be provided for the appropriate laboratories. Air conditioning systems will be modified and new systems will be installed to provide temperature and humidity control for individual laboratory units. The Metallurgical Diagnostics Laboratory unit will be constructed as a Class 10,000 clean room.

An office area will be constructed adjacent to the new and remodeled laboratories to house engineering and support personnel.

Special Plastics Production Facility - TEC $17,900,000

This subproject will provide two separate buildings. The main building will be approximately 29,000 square feet gross and will include areas for silicone synthesis, cellular silicone compounds, silicone-based composite materials, a zero-discharge area, storage, office, and restrooms. The second building of approximately 4,400 square feet will contain a processing area for nonsilicone-based composite materials. Both buildings will be constructed with clear-span steel frame and steel frame with intermediate columns covered by insulated exterior metal walls and roof panels. Interior treatments will consist of masonry walls, metal stud and gypsum wallboard, concrete subfloor, concrete deck floors, and suspended ceilings in some areas.

A portion of the storage and cellular silicone compounding area requires 15 percent maximum relative humidity control, the remaining cellular silicone area requires 55 ± 10 percent relative humidity, all remaining areas will utilize a standard temperature and humidity environment. Safety features will be installed as necessary, including extra-hazard sprinklers and controls for the zero-discharge room. Standard processing equipment and special design processing systems will be provided.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

8. Brief physical description of project (contd.)

Electrical Products Manufacturing Building - TEC $25,500,000

This subproject will provide a new building for light manufacturing that will also include areas for product inspection, laboratories, offices, and restrooms. The building will be approximately 400 feet long by 240 feet wide with a total usable floor space of approximately 200,000 square feet. An additional 51,000 square feet will be provided in a basement area which will house heating, ventilating, and air conditioning equipment, custodial service station, electrical substation, building maintenance shop, and material storage.

The building will be a preengineered metal building installed on a concrete base. Utilities supplied to the building will include electricity, water, compressed air, and drains. Fire protection for normal hazard occupancy will be provided. Restrooms and elevators will be included.

This subproject will also provide an addition to an existing refrigeration equipment room, including additional chiller equipment, cooling tower, and electrical substation. Some underground utility mains will be rerouted and replacement parking space will be constructed.

Pantex Plant

Upgrade Weapons Staging Area Roads - TEC $2,200,000

The subproject provides for reworking and widening of existing roadbeds in the weapons staging area. The construction will consist of a new roadbed 15 feet wide in the east half of the staging area and 20 feet wide in the west half of the staging area. Total length will be 35,000 feet. Also included are 13 turning corners with a 95-foot radius, 4 railroad crossings, guard key-post stations consisting of 60 square yards of paving per station, added headwalls, and replacement culverts.

Mound Facility

Production Support Building - TEC $5,100,000

This subproject consists of remodeling and upgrading existing facilities in a maintenance building and a warehouse and additions to and modification of an existing storage building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations	2. Project No.: 82-D-146

8. Brief physical description of project (contd.)

The remodeling and upgrading will provide new shipping and receiving offices, expanded services offices, and automatic data processing (ADP) capacity for materials control. A new explosives bunker and an additional 8,000 square feet of unheated bulk storage space will be built. A 9,000-square-foot office mezzanine will be added to an existing building and approximately 15,400 square feet of new shipping, receiving, and material supply space will be added to an existing building. Appropriate utilities, fire protection, and restroom facilities will be provided.

Rocky Flats Plant

Production Support Building - TEC $10,500,000

This subproject provides for a new multiuse facility consisting of a two-story support building of approximately 69,000 square feet; 46,000 square feet of this will be offices, a cafeteria, a lobby, interview areas, conference room, and support areas; the remaining 23,000 square feet will be warehouse. The facility will be accessible to all offsite traffic and functions which routinely involve access by vendors, commercial trucking, and other uncleared persons. The facility will include areas for warehousing, receiving, inspection, and offices. The facility will be designed with an emphasis on energy conservation and efficiency. Construction will consist of a combination of masonry, precast concrete, and structural steel framing as required to satisfy passive solar and structural needs. Additional features include fully insulated walls and roof, automatic fire sprinklers, parking for visitors and employees, paved access areas for warehouse traffic and exterior storage, and security fencing around the facility. Tie-ins to existing utility systems will be made where feasible.

Y-12 Plant

Electronic Standards and Calibration Shop Upgrade - TEC $3,700,000

This subproject provides for an 8,000-square-foot addition to the northeast corner of an existing electrical shop and modifications to the building which include relocation of partitions and modification of some services. Major equipment to be provided includes numerical control equipment simulators, computer equipment simulators, oscilloscopes, and numerous other equipment certification items.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations
2. Project No.: 82-D-146

9. Purpose, justification of need for, and scope of project

This project provides production space, additional support facilities (such as office space, warehouses, materials certification, and standards laboratories), and road improvements required at five locations. Requirements for these improvements are driven by workload projections for the mid-1980's.

Product mix and complexity of weapons delivered are very significant factors in determining the weapons production plants' capacity. Today's weapons are much more complex than those of the early 1970's.

The workload of the 1980's must be accomplished with one less final assembly plant and a manufacturing complex which has aged and deteriorated and requires expansion and upgrading.

The last major expansion of direct manufacturing and manufacturing support space occurred under Project 68-2-A, initiated in FY 1968. Available support space is now saturated. Laboratories, offices, and storage and materials staging space are being preempted or displaced by production activities. At Kansas City (Bendix), Rocky Flats, and Mound, several vital support activities have been, or soon will be, relocated to leased offsite space to release existing onsite support space for production. These activities should be relocated onsite in time to adequately and economically support the production workload of the mid-1980's.

A brief justification for each of the subprojects is provided below:

Kansas City Plant (Bendix) - Consolidated Materials Laboratories

This subproject will consolidate the current activities and expansion of several materials analysis and development laboratories. The subproject will provide additional space for metallurgical diagnostics, polymer formulation, chemical testing, and physical testing capabilities. This expansion is essential to meet the requirements for analytical, diagnostic, and material characterization support of the programmatic workload defined. With the greater complexity of components, the trend toward increasing the number of tests as well as more sophisticated tests is expected to continue. New weapon programs will continue to increase the workload of the materials evaluation laboratory. The expansion of the materials laboratory is necessary to house additional equipment representing new capabilities and added capacity.

Special Plastics Production Facility

The special plastics production facility will provide the weapons complex with a production capability for polymeric materials which, for various reasons, are not available from commercial sources in the desired quality or quantities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

9. Purpose, justification of need for, and scope of project (contd.)

Electrical Products Manufacturing Building

Analysis of the nuclear weapons production schedules through FY 1986 has shown that new building space is required at the Kansas City (Bendix) Plant. The production schedule will require a total plant population of more than 8,300 employees in FY 1983, higher than any previous employment level. Space requirements will be accommodated in the near term by leasing space until a new building can be provided.

Occupancy of the new building will meet two major objectives: (1) to relieve congestion in existing facilities, and (2) to provide a productive work environment for employees awaiting security clearance.

Manufacturing operations for products including electronic timers, multiwire cable, transformers, flat cables, and the encapsulation operations for these products will be relocated to the new building. Engineering and inspection functions for these manufacturing departments will also be relocated to the new building. Removal of these activities from the main building will make space available for the expansion of remaining manufacturing operations.

The functions in the new building will be structured so that both cleared and uncleared personnel will be utilized in all departments. This feature becomes more important since the time required to obtain security clearances has increased. Clearances now require four to five months.

Pantex Plant - Upgrade Weapons Staging Area Roads

The safe-secure trailer traffic is imposing loads on the pavement structure that exceed the design loads. The roads in the staging area have deteriorated to the state that repair is not economically feasible. Tractor-trailers and patrol vehicles are running off the road at the corners at the guard key posts, increasing the maintenance in those areas.

Mound Facility - Production Support Building

Introduction of a new tritium technology into the existing Tritium Building necessitates a general relocation of activities from the Tritium Building to three other buildings. There is no acceptable alternative for the placement of the new tritium technology in the Tritium Building. This project will provide modifications and upgrading required to accommodate the necessary relocations. This project will also upgrade facilities to increase capabilities and capacities in line with general support requirements. It will provide improved productivity, responsiveness, safety, and security capabilities in materials management support to all facility programs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

9. Purpose, justification of need for, and scope of project (contd.)

Rocky Flats Plant - Production Support Building

Existing office space at the Rocky Flats Plant consists of permanent structures, 25-year-old mobile trailers, temporary portable buildings, and offsite leases. The plant's present office and manufacturing space is severely overcrowded with no room for expansion. During the 1980's, planned effort at Rocky Flats significantly increases. The total plant growth during the next six years is estimated to be approximately 1,360 people. Approximately 600 of the 1,360 people will be programmatic personnel requiring offices. In addition, it will be necessary to convert 18,000 square feet of office space to production space. This further aggravates the office space problem.

The direct benefit of the production support building will be to make space available for additional personnel required to support increased weapons production mission requirements.

The additional warehouse space provided by this project will reduce the current inefficiency created by double and triple handling of select items that are improperly stored. This extra handling causes higher labor costs and increases the potential for damage or breakage of material. The combined effects of these potential costs are conservatively estimated at $400,000 per year.

Without the new building, it will be necessary to lease additional offsite office space, secure additional temporary onsite buildings; relocate, upgrade, and continue to use 25-year-old trailers; and lease offsite warehouse storage. Approximately 27,000 square feet of offsite office space are currently under lease. Further, space requirements in FY 1981 will require construction of six temporary buildings on the plant site during FY 1981.

Y-12 Plant - Electronic Standard and Calibration Shop Upgrade

Beginning in late FY 1983, present facilities will be unable to handle the anticipated workload caused by increased production support requirements. The increase in the scheduled plant production workload directly influences the need for expansion of the existing electronic shop, standards laboratory, and vacuum technology facilities to accommodate equipment for: maintenance and preparation of measuring and control instrumentation; calibration of gas analyzers, surface finish, nondestructive testing, oscilloscopes, and mass equipment for product certification; and the maintenance of leak detectors and residual gas analyzers. The addition of production system simulators will be needed to support the following types of equipment: remote job entry terminals, computer controllers, numerically controlled (NC) controllers, and safeguards equipment. Also, adequate space for these production system simulators will be required. Additional test equipment will also be needed for supporting these expanded facilities and are a part of this project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations	2. Project No.: 82-D-146

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at 12% of construction cost, item b		$ 5,700 b/
b. Construction costs		48,000
(1) New buildings, approximately 297,000 square feet at a composite estimate of about $105 per square foot	$31,400	
(2) Building modifications, approximately 68,400 square feet at a composite estimate of about $170 per square foot	11,600	
(3) Special facilities	3,300	
(4) Utilities	1,700	
c. Standard equipment		14,300
Subtotal		68,000
d. Contingency at approximately 6% of above costs		4,200
Total estimated cost		$72,200

The estimates by location and project are as follows:

Bendix Plant, Kansas City, Missouri	$50,700
Pantex Plant, Amarillo, Texas	2,200
Mound Facility, Miamisburg, Ohio	5,100
Rocky Flats Plant, Golden, Colorado	10,500
Y-12 Plant, Oak Ridge, Tennessee	3,700
Total	$72,200

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Estimate based on completed Title I and Title II designs on two subprojects and on preliminary information from Title I and Title II design for remaining subprojects.

b/ Excludes $275,000 Plant Engineering and Design funding (Kansas City (Bendix) $175,000 and Pantex $100,000).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 1,211	$10,800	$19,600	$23,100	$13,000	$ 4,489	$72,200
(b) PE&D	275	0	0	0	0	0	275
Total facility costs	1,486	10,800	19,600	23,100	13,000	4,489	72,475
2. Other project funding							
(a) Conceptual design	165	0	0	0	0	0	165
(b) Other related project costs	0	0	221	0	0	0	221
Total other project costs	165	0	221	0	0	4,489	386
Total project funding (items 1 and 2)	$ 1,651	$10,800	$19,821	$23,100	$13,000	$ 4,489	$72,861 a/

b. Other related funding requirement (estimated project life - 20 years)

1. Facility operating costs	$ 5,880
2. Programmatic operating expenses directly related to the facilities	51,300
Total other related annual funding requirements	$57,180

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Construction line item

The construction line item includes all costs necessary to complete the facility.

(b) PE&D funding

$175,000 was provided to Bendix for design of the consolidated materials subproject and $100,000 provided to Pantex for design upgrade weapons staging area roads.

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a/ This total includes $1,651,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations	2. Project No.: 82-D-146

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Construction line item

The construction line item includes all costs necessary to complete the facility.

(b) PE&D funding

$175,000 was provided to Bendix for design of the consolidated materials subproject and $100,000 provided to Pantex for design upgrade weapons staging area roads.

2. Other project-related funding

(a) Conceptual design

A conceptual design is estimated to cost $165,000 to develop a budget quality cost estimate and schedule.

(b) Other related project costs

Plant startup costs of $221,000 are required.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

The operating cost for the new facility will consist of routine maintenance, maintenance service, utilities service, operator staffing, and expense-type materials.

2. Programmatic operating expenses directly related to the facilities

Personnel costs pertaining to employees to be housed in the facility.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Missile X warhead production facilities, various locations	2. Project No.: 81-D-115
3. Date A-E work initiated: 1st Qtr. FY 1981	5. Previous cost estimate: $125,000 Date: 3/82
3a. Date physical construction starts: 3rd Qtr. FY 1981	6. Current cost estimate: $125,000 Date: 1/83
4. Date construction ends: 4th Qtr. FY 1986	

7. Financial schedule a/

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$10,000	$ 5,000	$ 4,826	$ 2,068
1982	30,000	9,100	9,268	5,964
1983 a/	34,100	60,000	60,006	17,000
1984	30,000	30,000	30,000	52,900
1985	20,900	20,900	20,900	36,600
1986	0	0	0	10,468

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

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a/ Construction progress in FY 1981 and FY 1982 was limited by funding. Construction progress in FY 1983 has been stopped, pending receipt of appropriate congressional approval to obligate FY 1983 funding, temporarily withheld to ensure that expenditures on warhead production facilities are consistent with congressional action on the MX missile system. Project cost estimates, funding requirements, and completion schedule may require adjustments. Additional FY 1983 and/or FY 1984 funding may be requested by the Administration as a result of future Congressional action.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile X warhead production facilities, various locations
2. Project No.: 81-D-115

8. Brief physical description of project

The project will provide new production facilities for the production of a nuclear warhead for the Air Force Missile X (MX) system. Current Air Force planning calls for deployment of a reentry vehicle in the MX system called the Advanced Ballistic Reentry Vehicle (ABRV).

Production of the MX warhead requires the addition of new production capabilities and increased production capacities at the various production plants. Although design and production methods have been planned, some changes in currently planned types of equipment may be required and the planned construction may require nominal changes. Following are current examples of equipment and facility modifications that are currently planned for this project: (1) facilities for subassembly production (2) facilities for the production of safety features, (3) plating equipment, (4) microelectronics production equipment, (5) environmental certification equipment, and (6) equipment for new capability and additional production capacity required to meet the production schedule. Two new buildings will be required to permit relocating storage and other functions outside existing manufacturing areas at the Bendix and Pinellas Plants. A 54,000-square-foot warehouse will be built at the Bendix Plant, and a 22,000-square-foot building will be built at the Pinellas Plant to provide space for MX manufacturing equipment.

Required utility services which include water, steam, and electricity will be extended from existing building systems.

Weapon production plants that will require building modifications and/or equipment to achieve the necessary MX warhead production capability include the Y-12 Plant, Oak Ridge, Tennessee; the Bendix Plant, Kansas City, Missouri; the Pantex Plant, Amarillo, Texas; the Pinellas Plant, St. Petersburg, Florida; the Rocky Flats Plant, Golden, Colorado; and the Mound Facility, Miamisburg, Ohio.

The $125,000,000 estimate is based on requirements for an ABRV warhead. This estimate accommodates subsequent changes in the overall weapons program production requirements and changes in production schedules have resulted in increased requirements for operating floorspace at the Bendix and Pinellas Plants and for increased equipment requirements at the Rocky Flats Plant.

The requested FY 1983 funding will be used for engineering design of building modifications, to initiate procurement of long-lead equipment, and to start construction. The requested FY 1984 funding will continue construction and procurements at all locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile X warhead production facilities, various locations

2. Project No.: 81-D-115

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide increased capability and capacity in the existing weapons production plants needed to produce the nuclear warhead for an Intercontinental Ballistic Missile (ICBM) MX reentry vehicle.

An agreement has been reached by this agency and the DOD to proceed with Phase 3 full-scale development of production facilities for the ABRV warhead. Significant progress in engineering design and in long-lead procurement must be achieved and construction must begin in FY 1983 to permit completion of the facilities in time to meet the production schedules.

This project provides for construction of new production facilities required to produce a new warhead of enhanced safety design incorporating insensitive high explosive (IHE) for use with the ABRV. The project estimate provides for the new production capabilities required to manufacture warheads and provides for additional production capacity.

Maximum use will be made of existing manufacturing facilities in preparing for the M-X warhead production program. However, unique features of the new weapon will require capabilities not currently available in the production plants and will require additional capacities to produce the additional numbers of parts at the production plants.

A number of major design and process uncertainties are known at this time which will be resolved as Phase 3 proceeds. An allowance of $13,600,000 has been made in the current cost estimate to cover the numerous design uncertainties relating to the facilities required to manufacture the nuclear warhead.

10. Details of cost estimate a/	Item cost	Total cost
a. Engineering, design, and inspection at approximately 20% of construction costs, item b		$ 9,000
b. Construction costs		49,500
(1) Building modifications, including expansion and conversion of technical areas at the Y-12 Plant, Bendix Plant, Pinellas Plant, and the Mound Facility	$ 8,000	
(2) Two new buildings, approximately 76,000 square feet total, at approximately $132 per square foot	10,000	
(3) Special facilities including electroplating lines, metal casting systems, mold heating systems, and for subassembly production facilities	31,500	
c. Standard equipment including presses, milling machines, final assembly, and inspection and certification equipment		40,000
Subtotal		98,500

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a/ Estimate based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile X warhead production facilities, various locations

2. Project No.: 81-D-115

10. Details of cost estimate (contd.)

d. Contingency at approximately 14% of above costs	12,900
e. Weapons design and process uncertainties	13,600
Total estimated cost	$125,000

The estimates by location are as follows:

Y-12 Plant, Oak Ridge, Tennessee	$ 44,100
Bendix Plant, Kansas City, Missouri	19,400
Mound Facility, Miamisburg, Ohio	24,300
Rocky Flats Plant, Golden, Colorado	14,600
Pantex Plant, Amarillo, Texas	2,000
Pinellas Plant, St. Petersburg, Florida	7,000
Uncertainties	13,600
Total	$125,000

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 8,032	$17,000	$52,900	$36,600	$10,468	$125,000
Total facility costs	8,032	17,000	52,900	36,600	10,468	125,000
2. Other project funding						
(a) Conceptual design	300	0	0	0	0	300
Total other project funding	300	0	0	0	0	300
Total project funding (items 1 and 2)	$ 8,332	$17,000	$52,900	$36,600	$10,468	$125,300 a/

a/ This total includes $8,332,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Missile X warhead production facilities, various locations	2. Project No.: 81-D-115

12. Pending schedule of project funding and other related funding requirements (contd.)

b. Other related funding requirements (estimated life of project: 5 years)

1. Facility operating costs	$ 6,000
2. Programmatic operating expenses directly related to the facility	15,000
Total other related funding requirements	$21,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
  1. Other project funding
    (a) Conceptual design

Conceptual design costs of approximately $300,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of these facilities will be at least five years.

1. Facility operating costs

Approximately $6,000,000 per year will be spent to cover the cost of utilities, maintenance, janitorial services, and related overhead costs for the new M-X warhead production facilities.

2. Programmatic operating expenses directly related to the facility

The annual cost of direct labor, materials and supplies, tooling procurement, tooling fabrication, and overhead is estimated at $15,000,000 per year while operating at full production.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Control of effluents and pollutants, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 81-D-120

3. Date A-E work initiated: 4th Qtr. FY 1979

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $7,450
Date: 1/82

6. Current cost estimate: $7,639
Less amount for PE&D: 1,239 a/
Net cost estimate: $6,400
Date: 1/83

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$3,000	$3,000	$2,000	$ 0
1982	3,400	2,400 b/	-2,000 c/	0
1983	0	0	5,400	1,800
1984	0	1,000	1,000	2,100
1985	0	0	0	2,500

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

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a/ Design for this project was authorized and funded under Project 79-8, Plant Engineering and Design, Various Locations.

b/ $1,000,000 in FY 1981 appropriations was deferred in support of the FY 1981 Augmented Test Program. These funds were not restored in FY 1982.

c/ FY 1982 appropriations were not sufficient to permit initiation of construction as planned. Obligated FY 1981 funds were deobligated and start of construction has been delayed. Project cost estimate, funding requirements, and schedule may require adjustment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Control of effluents and pollutants, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 81-D-120

8. Brief physical description of project

This project includes the installation of new treatment facilities to control releases of gaseous and liquid pollutants from the Y-12 Plant. New pollution control facilities to be provided include hydrogen fluoride scrubbers to process gaseous effluents from uranium recovery processes and a central pollution control facility to treat chemical acid wastes.

Hydrogen fluoride scrubbers will be installed in two existing buildings where enriched uranium recovery processes are located. Recirculating scrubbers will be designed to use water or potassium hydroxide solution to capture gaseous effluents from fluid bed reactors used in the conversion of uranium dioxide to uranium fluoride. Dual bank storage arrays will be provided for storage of waste solution from the scrubbers. Canned rotor pumps will be used for scrub solution recirculation. Plastic lined tankers will be provided for transport of this solution to the disposal site. Some demolition and relocation of existing facilities will be necessary. Utility and electrical services will be extended from nearby existing service headers.

The central pollution control facility will consist of a new multilevel building having approximately 20,000 square feet of floorspace and chemical processing equipment for treatment of liquid acid wastes. The building will be a 4-level preengineered building and will include space for an office, control room, chemical laboratory, and restrooms. The basement level will contain waste collection vessels. The first floor will house the support facilities and reverse osmosis filtration and sludge packaging equipment. A reactor clarifier, settling tanks, and electrical service equipment will be installed on the second floor. Process reactors and recycle water head tanks will be installed on the third floor. An existing cooling tower basin will be converted for storage of incoming wastes and effluents. Construction of process systems will use polyolefin collection tanks, polyvinyl chloride piping, acid brick, and special alloy metals such as stainless steel and hasteloy. The central pollution control facility will be located within the main processing area of the Y-12 Plant near the sources of the liquid waste to be treated.

When appropriations for this project became incumbered by funding deferral and general reduction of FY 1982 appropriations, a new centrifuge system for cleanup of electrochemical machining coolants and protection for a drainage point (originally included in this project) were deleted from the project and completed using general plant project funding. Design of the remaining work is complete and prepared for construction contracting.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide facilities for treatment of gaseous and liquid effluents from the Y-12 Plant required to comply with State of Tennessee and Federal air and water pollution control regulations.

Present gaseous hydrogen fluoride emissions to the atmosphere from the Y-12 Plant enriched uranium recovery operations exceed State of Tennessee standards which pertain under the 1977 Amendments to the Clean Air Act. Further, the emission rates are expected to increase significantly over the next several years due to projected increases in the level of uranium recovery

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Control of effluents and pollutants, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 81-D-120

9. Purpose, justification of need for, and scope of project (contd.)

operations. Facilities are required for effective treatment of the hydrogen fluoride emissions to bring the Y-12 Plant into compliance with the State of Tennessee standards. Authorization of this project will permit the Y-12 Plant to establish a schedule for compliance with the current standards and possibly avoid litigation and noncompliance penalties.

Several sources of liquid pollution have been identified that require treatment to meet the 1984 requirement of the Federal Water Pollution Control Act. Liquid pollutants which require treatment include cleaning, pickling, and plating wastes which are currently being discharged into seepage ponds. The central pollution control facility to be provided by this project will permit the Y-12 Plant to terminate this seepage disposal. A significant reduction of liquid pollutants into the seepage ponds was effected by recent completion of the new recycle and denitrification facility. However, wastes that continue to be discharged into the seepage ponds are known to contain such pollutants as uranium, beryllium, chromium, nickel, copper, nitrates, and fluorides. The central pollution control facility will also treat solutions used to clean floors in certain process areas which become contaminated with beryllium and uranium particulates.

The annual facility operating cost associated with this project is estimated at $600,000.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 12% of construction costs, item b		$ 600 b/
b. Construction costs		5,090
(1) Improvements to land	$ 150	
(2) New building, approximately 20,000 square feet at about $115 per square foot	2,300	
(3) Special facilities, including gas scrubbers and centrifuge system	2,500	
(4) Utilities, including power, water, and sewage connections	140	
c. Standard equipment		30
Subtotal		5,720
d. Contingency at approximately 12% of above costs		680
Total estimated cost		$ 6,400 c/

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a/ Title I and Title II design is complete. The planned construction project completion schedule could not be met due to funding limitations. The schedule and total estimated cost are under review.

b/ All engineering for construction cannot be completed prior to award of a construction contract. Minor engineering is required after procurement of equipment for special facilities to adapt the systems to local utilities and existing conditions.

c/ Excludes FY 1979 design funding of $1,239,000 provided under Project 79-8, Plant Engineering and Design, Various Locations.

	FY 1983 Appropriation	FY 1984 Request
Program Direction	$ 50,091	$ 55,930

Included within the Weapons Program Direction request is funding to support the following areas:

- Office of the Assistant Secretary for Defense Programs
- Office of Military Application
- Office of Inertial Fusion
- Albuquerque Operations Office
- Nevada Operations Office
- Community Assistance Programs at Los Alamos, New Mexico, and Oak Ridge, Tennessee

Office of the Assistant Secretary for Defense Programs

The Office of the Assistant Secretary for Defense Programs provides overall direction and administration of Defense Programs activities to assure that operations are conducted in the most efficient manner consistent with Defense Programs mission objectives. Some specific support functions carried out by this office include:

- overall management of activities related to the accomplishment of the Defense Programs mission;

- advising the Secretary of Energy on national security matters;

- providing senior management program direction and guidance;

- coordination of the development of Defense Programs plans and budgets;

- review of congressional proceedings and legislation impacting Defense Programs and development and coordination of Defense Programs congressional testimony preparation and presentation;

- providing the Assistant Secretary with information regarding the effectiveness of national security nuclear weapons development and production activities;

- management of the long-range planning process of the laboratories and Defense Programs participation in the Institutional Planning Process;

- management of Defense Programs manpower utilization and allocation function;

- development, implementation, coordination, and management of the Assistant Secretary's policy analysis program;

- reviewing, coordinating, commenting on, and making recommendations on Department of Energy directives, orders, and reports that affect Defense Programs management and planning; and

- exercising responsibility for the energy and utility management program within the Defense Programs complex, maintaining cognizance over field office/contractor energy/utility management activities, and maintaining contacts with the Department of Energy's energy organizations.

Office of Military Application

Program management and support functions performed by Office of Military Application personnel in support of the overall objectives of the weapons program include:

- program management, direction, and support;
- development of program goals and objectives;
- formulation of plans and budgets for program accomplishment;
- presentation and defense of the proposed budgets to the President and the Congress;
- conduct of studies, analyses, and evaluations to assure proper program accomplishment;
- coordination of programs with other Federal agencies, the Office of Management and Budget, Congress, and numerous contractors;
- implementing emergency preparedness policy related to the Crawford Committee Report on Safety Assessment of Department of Energy Nuclear Reactors;
- management of the nuclear weapons complex in an effective and efficient manner; and
- execution of plans and directives for development and production of nuclear weapons.

Office of Inertial Fusion

Program management and support functions performed by Headquarters personnel in support of the overall objectives of the Inertial Confinement Fusion program include:

- managing the overall national Inertial Confinement Fusion program using the lead laboratory framework;
- developing program goals, objectives, and priorities;
- planning of the program and implementing plans to meet goals and objectives;
- monitoring, evaluating, and approving mainline program efforts at the weapons laboratories;
- presenting and defending the proposed budgets to the Office of Management and Budget and the Congress; and
- coordinating program efforts with field offices, other Federal agencies, and contractors.

Albuquerque Operations Office

The Albuquerque Operations Office is responsible for executing plans and directives regarding the weapons production levels and schedules at seven production facilities, the administration of the Los Alamos National Laboratory and Sandia National Laboratories contracts pertaining to nuclear and nonnuclear research and development for the weapons program, the safe transport of all Government-owned strategic quantities of special nuclear materials, and the effective management of all assigned program and project activities including energy and nonweapons programs. They also administer the contracts for five production contractors and provide programmatic direction to all seven of the production contractors. These production contractors will employ approximately 28,500 people in FY 1984. The direct nuclear weapons production workload has been increasing substantially since FY 1980 and will continue to increase through FY 1986.

Nevada Operations Office

The Nevada Operations Office is responsible for managing the Nevada Test Site, currently the only area in the United States approved for underground nuclear testing. This responsibility consists of providing the Government-owned facilities site engineering, construction, and logistical support for conducting nuclear testing. These objectives are accomplished by the utilization of a small cadre of Federal employees who provide management oversight of the work being performed by contractor personnel.

Community Assistance Program

The Department of Energy administers the Community Assistance Program under Section 91 of the Atomic Energy Community Act of 1955, as amended, to provide assistance to specified units of local government in the communities associated with the Los Alamos National Laboratory and Oak Ridge energy complex. The statutory purpose of the assistance is to compensate the Los Alamos and Oak Ridge communities for their lack of an industrial or commercial tax base and to attract and retain employees at the Federal energy facilities in those communities.

The Department of Energy has implemented the statutory mandate by entering into assistance contracts with Los Alamos County, the Los Alamos County School Board, the City of Oak Ridge, and Roane County, Tennessee, utilizing the funding formula adopted in 1979 by the Department of Energy Working Group on Community Assistance. The contracts specify the amounts of assistance the Department has agreed to supply, based on the statutory standards of need. To insure satisfaction of the statutory requirement that the communities make full use of their own resources, the Department has entered into agreements with the City of Oak Ridge, Roane County, and Los Alamos County, as recommended by the Department of Energy Working Group on Community Assistance, to finance projects designed to reduce the long-term dependence of the communities on assistance from the Department of Energy. This financing is in the amount of 10 percent of the assistance payments computed by the contract formula for the recipients at Oak Ridge and 5 percent of the assistance payments for Los Alamos County, to be matched by equal amounts from the recipients. The Department also has commitments to provide assistance payments and self-sufficiency project funding to Anderson County, Tennessee, on the same basis.

PROGRAM DIRECTION FUNDING REQUIREMENTS

The FY 1984 request is presented in the following table:

	FY 1983 Appropriation	FY 1984 Request
Office of Assistant Secretary for Defense Programs	$ 1,100	$ 1,615
Office of Military Application	3,736	4,245
Office of Inertial Fusion	900	970
Albuquerque Operations Office	21,335	23,873
Nevada Operations Office	11,537	12,515
Community Assistance Program - Los Alamos	6,255	6,720
Community Assistance Program - Oak Ridge	5,228	5,992
Total	$50,091	$55,930

These funds provide for the salaries, other personal services, benefits, travel expenses, and contractual services for the following levels of Federal employees:

	FY 1983 Full-Time Equivalents			FY 1984 Full-Time Equivalents		
	Full-Time Permanent	Other-Than-Full-Time Permanent	Total	Full-Time Permanent	Other-Than-Full-Time Permanent	Total
Office of Assistant Secretary for Defense Programs	20	3	23	27	3	30
Office of Military Application	85	4	89	87	4	91
Office of Inertial Fusion	16	0	16	16	0	16
Albuquerque Operations Office	448	25	473	469	21	490
Nevada Operations Office	237	10	247	249	12	261
Total	806	42	848	848	40	888

Included within these funds are the assistance payments to the Los Alamos and Oak Ridge communities.

JUSTIFICATION FOR INCREASE IN FEDERAL MANPOWER

The requested increase of 40 full-time equivalent Federal personnel over the FY 1983 level includes 9 full-time equivalents that will be dedicated to implementing the Approved Action Plan developed in response to the March 1981 Crawford Committee Report entitled "A Safety Assessment of Department of Energy Nuclear Reactors"--2 full-time equivalents in the Office of Military Application, 3 full-time equivalents at the Albuquerque Operations Office, and 4 full-time equivalents at the Nevada Operations Office. These additional personnel are required to accomplish critical nuclear defense facility safety program responsibilities such as increased nuclear facilities safety, fire protection, occupational safety, and quality assurance services.

The requested increase of seven full-time equivalents for the Office of the Assistant Secretary for Defense Programs is required to provide administrative and management support associated with accelerated defense programmatic activities projected through the 1990's. Support areas expected to be impacted by accelerated Defense Programs activities are: increased cognizance over field office/contractor energy/utility management; expanded budget planning and resource control support activities; extensive long-range planning for Defense Programs laboratories; broadened participation in Multiprogram General Purpose Facilities Program; increasing interagency and interoffice coordination activities; and full compliance with congressionally mandated legislative requirements as set forth in Section 148 of the Atomic Energy Act as amended by Public Law 97-90 (42 USC 2168).

The requested increase of 17 full-time equivalents at Albuquerque is required to support the increasing workload in the areas of clearances granted, reinstated, extended, and terminated; increased complexity of designs to comply with new energy standards, environmental, and special safety requirements; and continuing increases in the number and variety of contract actions. Additionally, nine of the positions are required to successfully proceed with the Waste Isolation Pilot Plant Project expected to be fully operable by the end of FY 1983. Specifically, seven Project Engineers, a Cost Control Analyst, and a Schedule/Planning Analyst are directly related to the site validation and facility construction start, the expanded scientific effort in research and development testing, and the waste certification requirements and associated engineering interface with waste generators, packaging, and transport entities. Three of the requested 17 full-time equivalents at Albuquerque are necessary to support radiation protection, occupational safety, emergency preparedness, and quality assurance requirements associated with the safety of Department of Energy nuclear reactors.

The requested increase of 14 full-time equivalents for Nevada is required to provide technical and administrative management support to carry out the anticipated increase in the testing activities at the Nevada Test Site as well as increased technical programs in the research and development activities in the weapons-related programs. An increase is also anticipated in Nevada's technical and administrative efforts for the capital restoration, revitalization, and energy technology programs. Further, in cooperation with the Department of Defense, Nevada anticipates continuing large-scale efforts at the Tonopah Test Range in the construction, support, and administrative services for this effort. Four of the requested 14 full-time equivalents are required for nuclear safety support to conduct environmental, safety, and health appraisals.

Federal Manpower Funding

Funding associated with the requested Federal positions for salaries and other personal services, benefits, and travel is outlined below:

	FY 1983 Appropriation	FY 1984 Request
Office of Assistant Secretary for Defense Programs	$ 1,100	$ 1,565
Office of Military Application	3,736	4,245
Office of Inertial Fusion	900	970
Albuquerque Operations Office	17,838	19,579
Nevada Operations Office	9,782	10,620
Total	$33,356	$36,979

Contractual Services

Funding is also included for those contractual services and supplies necessary to support the annual administrative requirements for operations at Albuquerque and Nevada. In addition, $50,000 is allocated for Headquarters personnel training requirements which were previously funded under Departmental Administration.

	FY 1983 Appropriation	FY 1984 Request
Albuquerque Operations Office	$ 3,497	$ 4,294
Nevada Operations Office	1,755	1,895
Office of Assistant Secretary for Defense Programs	-	50
Total	$ 5,252	$ 6,239

The contractual services estimates at Albuquerque and Nevada have been developed based on detailed analysis of the services and materials required for the economical and efficient support of programmatic activities conducted at these offices. Specifically, these funds provide for communication services, rents and utilities, printing and reproduction, janitorial and custodial services, vehicle services, automatic data processing services, and supplies and materials.

JUSTIFICATION FOR COMMUNITY ASSISTANCE PAYMENTS

The requested level of funding for the Community Assistance Program will support the Department's obligations under assistance contracts.

A detailed summary of funding for the program by year and type of assistance follows:

Community Assistance Payments	FY 1983 Appropriation	FY 1984 Request
Los Alamos		
Civic Activities	$ 30	$ 30
County:		
Assistance Payments	1,523	1,799
Schools--Assistance Payments	4,702	4,891
Subtotal	6,255	6,720
Oak Ridge		
Assistance Payments:		
City of Oak Ridge	2,848	3,180
Anderson County	1,157	1,330
Roane County	1,223	1,482
Subtotal	5,228	5,992
Total Community Assistance	$11,483	$12,712

The estimate of $30,000 for civic activities at Los Alamos is requested to cover the cost of maintaining Federal facilities located in the Community. The requested amounts for assistance payments will fund the Department of Energy's obligation, as determined in accordance with the formula described in the contracts with the county and the schools, based on the provisions of the Atomic Energy Community Act of 1955, as amended.

Similarly, the City of Oak Ridge, Anderson County, and Roane County continue to require financial assistance under the Atomic Energy Community Act of 1955, as amended. The financial assistance estimates are derived by a formula recommended by the Department of Energy Working Group on Community Assistance.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Defense Programs
Verification and Control Technology
Atomic Energy Defense Activities
(Tabular dollars on thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Verification & Control Technology (DP)				
Verification & Control Technology				
Operating Expenses.	$49,280	$50 600	$50,600	$57,150
Capital Equipment	1,100	1,500	1,500	1,750
Subtotal	$50,380	$52,100	$52,100	$58,900
Program Direction				
Operating Expenses	1,620	1,800	2,460	2,750
Subtotal	1,620	1,800	2,460*	2,750
Total				
Operating Expenses	$50 900	$52,400	$53,060	$59,900
Capital Equipment	1,100	1,500	1,500	1,750
Verification and Control Technology	$52,000	$53 900	$54,560	$61,650
Staffing FTP/Total FTEs	36/38	49/53	49/53	56/60

Authorization Sections 35 & 36, P. L. 87-297

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*Funding of $660,000 is required for salaries and related expenses for 16 FTE's engaged in intelligence functions within the Verification and Control Technology program authorized in FY 1983.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
VERIFICATION AND CONTROL TECHNOLOGY
(In thousands of dollars)

FY 1983 Appropriation enacted	$53,900
Built in increases and decreases:	
Authorized FTE increase for DOE intelligence functions	+660
FY 1984 base	$54,560
Program increases and decreases:	
o Supports production of nuclear detonation detection sensors for Integrated Operational Nuclear Detonation Detection System (IONDS)	+4,080
o Supports national security technical analyses for arms control, export control, nuclear weapon and proliferation issues	+2,400
o Maintains space, seismic and non-seismic technology base to support U.S. verification efforts	320
o Additional 7 FTE's	290
FY 1984 budget request	$61,650

The overall goal of the Verification and Control Technology program is to support U.S. national security and foreign policy development and execution in the areas of treaty verification, intelligence arms control and export control as they relate to nuclear weapons issues. In fulfilling these responsibilities the program: 1) develops and produces technology to monitor nuclear explosions; 2) controls the export of technology related to DOE areas of responsibility; 3) provides technical and analytical support for the Department's role in nuclear arms control negotiations; and 4) manages DOE's intelligence functions.

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses..................	$ 50,600	$ 57,150

The increase of $6,550,000 is attributable to increased deliveries of nuclear explosion detection sensors which ride on satellites and increased requirements to conduct special technical analyses of national security issues related to nuclear weapons, and to Departmental intelligence responsibilities.

Verification and Control Technology activities supported by operating expenses can be divided into two categories, detection technology and analytical support. Detection technology activities develop means of detecting nuclear weapon activities such as nuclear explosions. Analytical support activities utilize nuclear weapon technical expertise to evaluate arms control proposals, make determinations on export license applications, technology transfer issues, and analyze foreign nuclear weapon-related activities. Verification and Control Technology efforts are carefully coordinated with the Departments of Defense, State, the Arms Control and Disarmament Agency and Commerce, as well as with the Nuclear Regulatory Commission and the Central Intelligence Agency.

Detection Technology

In FY 1984 $41,650,000 is being requested for detection technology activities. This represents an increase of $4,150,000 over the FY 1983 funding level, and is required to support a variety of technical activities related to the detection of nuclear weapon activities through space, seismic, nonseismic, and other scientific efforts Detection technology activities are performed in direct response to nuclear test treaty and other national requirements. These requirements involve the detection of nuclear explosions conducted underground, in the atmosphere or in space. The Verification and Control Technology program will fabricate a nuclear explosion detection sensors that ride on Department of Defense (DOD) satellites, such as the Global Positioning System (GPS) satellites, on a secondary mission basis.

In addition to conducting the research, development and fabrication of sensors, the Verification and Control Technology program also provides, in conjunction with the Air Force, operational support to sensors once they have been delivered. This support includes maintaining the readiness of the sensor after delivery to the spacecraft manufacturer, analyses of data received from deployed sensors, and periodic testing and calibration to ascertain the state of health of deployed sensors.

The ocean areas of certain regions present a potential for small yield nuclear explosions to escape detection at the present time. In the interim, use of other sensor systems such as marine platforms carrying nuclear detectors (i.e., free-floating buoys) may be feasible and could assist in resolving uncertainties over potentially ambiguous events. DOE resources are being applied toward this goal in the design/fabrication of a suitable marine platform and in the study of background radiation and debris transport mechanisms to provide data for development of sensor deployment strategies. Verification and Control Technology managers are coordinating the participation of DOE laboratories and advising the Air Force on the adequate testing of these platforms. It is then anticipated that the Air Force will eventually pursue final development procurement and deployment of the marine platforms. Apart from a final operational decision, it is believed that the technical analyses encompassed by this program will contribute significantly to a basic understanding of ambient background levels, radionuclide deposition patterns, and air mass movements in certain geographic areas.

In the seismic detection effort, no significant changes are planned for FY 1984. The five-station Regional Seismic Test Network deployed in the United States and Canada will continue in operation. This research tool is designed to learn how a similar system might be operated to monitor a country's compliance with nuclear weapon testing restrictions through the detection of regional (i.e., short range) versus teleseismic (i.e., long range) signals. Supporting this effort is a program which analyzes seismic data to help distinguish between signals generated by underground nuclear explosions and those generated by earthquakes, mine excavation activities, etc.

The nonseismic detection efforts -- ionospheric and infrasonic monitoring -- will also continue without any major change in program emphasis. Both the ionospheric technique, which monitors the upper layers of the atmosphere, and the infrasonic technique, which monitors extremely low frequency sound, are capable of detecting signals generated by underground nuclear explosions. The issue facing these research and development efforts is to determine whether they can be relied upon as supplementary means of verifying a country's compliance with nuclear test treaty limitations. To this end, research efforts focus on developing the capability to determine whether ionospheric and infrasonic signals generated by nuclear explosions can be distinguished from those generated by earthquakes, thunderstorms, missile launches or other phenomena. Technologies such as these nonseismic efforts could prove extremely valuable treaty monitoring methodologies since they would not have to be deployed within the borders of a country to determine whether it is abiding by nuclear testing constraints.

DOE bears certain responsibilities under the not-yet-ratified Threshold Test Ban Treaty (TTBT) and its companion Peaceful Nuclear Explosions Treaty (PNET). Under the PNET, the U.S. and the Soviet Union would be permitted to conduct observations and examinations on each other's territories for PNEs to make sure that explosions conducted under the treaty's terms do not, in fact, have hidden military benefits. In the event that the PNET and TTBT are ratified, as presently signed, the Verification and Control Technology program is charged with providing the equipment, manpower, expertise and the full range of capabilities that will permit the U.S. to fulfill this responsibility. The FY 1984 funding request will enable the DOE to maintain the equipment that would be used in the event of overseas deployment. If the TTBT and PNET treaties, which have already been signed, are ratified, additional resources would be needed to assemble an operational team.

Analytical Support

In FY 1984 $15,500,000 is requested for analytical support activities. This represents an increase of $2,400,000 over the FY 1983 funding level and is required to conduct technically oriented analyses of a variety of issues related to the national security aspects of nuclear weapon policies. The Verification and Control Technology's analytical support activities are conducted through the national laboratories in support of DOE's export control/technology transfer arms control, weapons intelligence, and proliferation intelligence responsibilities. These activities provide a factual and analytical base to support U.S. needs in understanding the national security implications of possible test ban treaties, of export license decisions as they relate to proliferation and technology transfer concerns, and of foreign nuclear weapon programs. These activities serve the needs of the Departments of State, Defense and Commerce, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission and the Intelligence Community, as well as DOE. The weapon analysis program is aimed at understanding foreign nuclear weapon programs. The proliferation analysis program provides assessments of nuclear capabilities of possible proliferant countries.

CONSTRUCTION PROJECT DATA SHEET

I. Title and location of project: Control of effluents and pollutants, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 81-D-120

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1984	FY 1985	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 1,800	$ 2,100	$ 2,500	$ 6,400
(b) Plant engineering and design	1,239	0	9	1,239
Total facility costs	3,039	2,100	2,500	7,639
2. Other project funding				
(a) Conceptual design	50	0	0	50
Total other project funding	50	0	0	50
Total project funding (items 1 and 2)	$ 3,089	$ 2,100	$ 2,500	$ 7,689 a/
.. Other related funding requirements (estimated life of project: 20 years)				
1. Facility operating costs				$ 600
Total other related funding requirements				$ 600

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Plant engineering and design

Title I and Title II design of this project was begun in FY 1979 using funds provided under Project 79-8, Plant Engineering and Design.

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a/ This total includes $3,089,000 from years prior to FY 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Control of effluents and pollutants, Y-12 Plant, Oak Ridge, Tennessee	2. Project No.: 81-D-120

13. Narrative explanation of total project funding and other related funding requirements (contd.)

2. Other project funding

(a) Conceptual design

Approximately $50,000 was required to prepare a conceptual design, preliminary schedule, and cost estimate for this project.

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

Facility operating costs of $600,000 are projected. This includes utilities, maintenance, janitorial services, and overhead.

The fulfillment of DOE responsibilities in the arms control and export control/technology transfer areas requires that technical analyses be performed to evaluate various arms control proposals and export control issues. DOE reviews more than 7,000 export control cases each year, many of which require analysis to insure that the export of certain items is consistent with U.S. national security and foreign policy objectives. This analysis includes the development and refinement of lists of militarily critical technologies to serve as the basis of future export regulations. Analyses are also performed on specific technologies to determine the technology transfer implications of cooperative programs with foreign countries. In the arms control area DOE provides direct technical support to U.S. delegations at such arms control forums as the U.N. Committee on Disarmament and test ban treaty talks in Geneva, and the U.N. General Assembly Special Session on Disarmament. The level of effort for these activities will not be substantially changed from FY 1983.

Program Direction	FY 1983 Appropriation	FY 1984 Request
	$1,800	$2,750

Program Direction funds provide for the salaries, benefits, and travel expenses for 60 FTE's (56 full-time and 4 part-time) associated with the management and direction of this program at the Headquarters facility located in Washington, D.C. These employees are responsible for technical and analytical program management of field activities, and execution of Headquarters staff functions. More specifically, these duties include:

- o Coordination and continuous review of research, development, test and fabrication, nuclear weapon treaty verification and intelligence activities accomplished in the weapons complex.
- o Participating in Interagency Groups related to arms control, nonproliferation and export control matters.
- o Processing export applications related to the control of nuclear and nuclear-related materials, technology and equipment.
- o Participating in arms control negotiations.
- o Providing Secretarial Officers with intelligence information relating to their programmatic responsibilities.
- o Assessing information in support of nuclear nonproliferation policy.
- o Participating in special interagency committees examining foreign nuclear weapons and foreign nuclear energy programs, capabilities, and resources.
- o Conducting the DOE Watch Office functions.
- o Analyzing information related to efforts by various countries to develop or acquire a nuclear weapon capability.
- o Providing collection support activities which will ensure that Headquarters and field analysts have access to special information related to their areas of study.
- o Providing support to DOE's non-defense programs in ensuring that they are aware of related to foreign energy R&D, oil and gas supplies etc.

Capital Equipment	FY 1983 Appropriation	FY 1984 Request
	$1,500	$1,750

Capital Equipment expenditures support research, development, test and production activities through the provision of test equipment and instrumentation related to the total program. FY 1984 reflects an increase of $250,000 in required funds. These increased resources will be directed toward meeting a continuing need to update test equipment at the Sandia National Laboratories, the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory. Most equipment is small scale bench test equipment such as oscilloscopes, electronic calibration devices and small scale electronic support devices.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Materials Production
Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Materials Production (DP)				
Operating Expenses				
Reactor Operations	$ 284,830	$ 331,000	$ 331,000	$ 497,745
Processing of Nuclear Materials	195,550[1]	262,150[1]	262,150	327,595
Supporting Services	156,154[2]	220,260	220,260	212,860
Enriched Material	0	0[4]	0	70,000
Program Direction	11,178[3]	14,000	15,800[5]	17,500
Subtotal Operating Expenses	647,712	827,410	829,210	1,125,700
Capital Equipment	65,300	107,700	107,700	102,500
Construction	242,600	267,650	267,650	257,100
Total Materials Production	$ 955,612	$1,202,760	$1,204,560	$1,485,300
Staffing FTP/Total FTE's	254/272	291/311	291/311	311/333

Authorization: Section 1, P.L. 83-703

1/ Includes comparability adjustment of $3,300,000 in FY 1982 and $3,700,000 in FY 1983 for operation of the plutonium oxide conversion line at Los Alamos National Laboratory, previously funded in the Energy Supply Research and Development Appropriation.

2/ Includes comparability adjustment of $254,000 in FY 1982 for common use stores inventories which were transferred to Materials Production in FY 1983 from the Departmental Administration Appropriation.

3/ Includes comparability adjustment of $9,378,000 in FY 1982 for transfer of program support for the Savannah River Operations Office from the Departmental Administration Appropriation to Materials Production in FY 1983.

4/ Excludes $109,000,000 for enriched material which is being included as a comparability adjustment to the Naval Reactors Program.

5/ Includes additional funding of $1,800,000 required in FY 1983 to support additional staffing for new and enlarged nuclear safety program responsibilities.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Materials Production
(in thousands of dollars)

FY 1983 appropriation	$1,202,760
Built in increases and decreases:	
Additional funding requirement for FY 1983 program direction	+ 1,800
FY 1984 Base	$1,204,560
Program Increases and Decreases:	
Increase for inflation impact on operating expenses and capital equipment, various locations	+ 65,600
Increase in reactor operations at Oak Ridge to support changeover in the reactor core production mode for the Savannah Rivers reactors, increased shipments of highly enriched uranium to Savannah River, and increased fuel fabrication requirements for the N Reactor	+ 4,200
Increase in reactor operations at Richland to support increased fuel fabrication and throughput requirements, and fuel storage basin recirculation and fuel handling in support of shipments to PUREX	+ 12,500
Increase in reactor operations at Richland to provide productivity improvements to maximize N Reactor output and minimize reactor down time	+ 7,600
Increase in reactor operating costs at Richland and Savannah River to support increased fabrication, reactor operations, assigned maintenance, security improvements, operating efficiency improvements, and reliability measures to ensure continuity of operations	+ 34,900
Increase in reactor operations at Savannah River to support changeover to a more efficient (Mark-15) core loading and blending activities	+ 3,000
Increase in processing at Idaho to support the startup and operation of the new Fluorinel and steam generation facilities	+ 10,900
Increase in processing at Richland for operation of the Plutonium Finishing Plant to recover material needed for blending activities	+ 5,600
Increase in processing at Savannah River to support increased processing activities and dismantlement of obsolete plutonium-238 facilities	+ 13,800
Increase in processing at Los Alamos National Laboratory for preparation of additional plutonium oxide for test reactors	+ 3,800
Increase in supporting services for critical maintenance spares for the reactors, processing plants and other essential facilities; additional security at Richland and Savannah River; additional common use stores, augmented production studies, etc.	+ 10,100
Increase in Program Direction to support additional full-time equivalents and contractual services at Headquarters and Savannah River	+ 1,700

SUMMARY OF CHANGES
Materials Production
(continued)

Decrease in capital equipment	- 5,200
Increase in construction funds for continuation of prior year projects	+ 13,770
Increase for Facility Restoration program to restore obsolete and deteriorated equipment and facilities to ensure that the Nuclear Materials Production complex operates both safely and efficiently	+ 10,170
Decrease for reactor safety and reliability improvements project 82-D-126 and associated support activities	- 3,400
Increase for final year funding for reactivation of the PUREX fuel processing plant at Richland and processing plutonium oxide product to metal at Los Alamos National Laboratory for weapons applications	+ 15,800
Decrease resulting from completion of L Reactor upgrade and startup activities	- 58,200
Increase for operation of L Reactor	+ 73,500
Decrease in funding for support of Special Isotope Separation research and development program	- 24,100
Increase to initiate program for restoration of the Idaho Fuel Processing Facility, Idaho	+ 5,000
Increase for separative work requirements for Savannah River Mark-15 and N Reactor fuel	+ 70,000
Increase in supporting services for support of the New Production Reactor	+ 3,000
Increased funding to support development of alternate tritium production methods	+ 4,200
Decrease in supporting services at Richland for conceptual design and development activities for expansion and modification to the existing fuel processing capabilities	- 3,100
Increase for a new construction project (84-D-130) at Savannah River to upgrade the processing plant's electrical distribution system	+ 5,600
Request Level	$1,485,300

Materials Production

Materials Production Objectives

- Provide nuclear materials for National Defense requirements and for allies under mutual defense agreements;
- Provide nuclear materials for agency reactor research and development programs, other government agencies, industry, and foreign governments under civilian agreements for international cooperation;
- Receive and process non-production reactor fuels (e.g., Naval propulsion reactors, research reactors, materials testing reactors, etc.) for recovery of plutonium, enriched uranium, and other materials;
- Make available sufficient N Reactor by-product steam to the Washington Public Power Supply System to generate up to 4.0 billion kilowatt-hours of electricity per year for the Bonneville Power Administration power grid;
- Manage scrap nuclear materials in a cost effective manner to recover and recycle valuable materials, minimize storage costs, and conserve materials and energy;
- Operate nuclear materials production facilities in a safe, secure, environmentally-acceptable, energy-efficient and cost-effective manner;
- Maintain technical capability to perform process improvements and develop technology for production operations; and
- Evaluate and develop new and replacement production facilities and Special Isotope Separation facilities to ensure the capability to meet long-term materials production requirements.

Materials Production - General

The goal of the Materials Production program is to provide nuclear materials to meet near term national defense and non-defense requirements and sustain a base production program capable of meeting long term nuclear materials production requirements consistent with the annual Presidential Nuclear Weapons Stockpile Memorandum and the annual DOE Materials Management Plan.

The current method of accomplishing this goal is the operation of a reactor feed material production complex, four production reactors, chemical processing plants at three major sites, R&D efforts on long-range alternatives for production of nuclear materials, and support facilities integral to the operation of the facilities mentioned above. A fifth production reactor, L Reactor at Savannah River, and a fourth spent fuel processing plant, the PUREX facility at Richland, will become operational in FY 1984.

These facilities are unique to the production of nuclear materials for defense purposes. There is no cost effective alternative production method within the U.S., at present or within the production planning period, for providing the nuclear materials required by the national defense program, other Federal programs, and industry.

Materials Production Operations

Highly-enriched uranium is recovered from spent Naval and R&D reactor fuels at Idaho, and shipped to the Oak Ridge Y-12 plant. This material is mixed with either virgin enriched uranium from the enrichment plants or uranium recovered at Savannah River from spent production reactor or R&D reactor fuels. This enriched uranium is then alloyed with aluminum and fabricated into fuel tubes for subsequent reactor charging with enriched lithium targets for tritium production or depleted uranium targets for plutonium production. The irradiated enriched uranium fuel is processed at the chemical processing plant at Savannah River for recovery and recycle of the remaining enriched uranium.

At Fernald, Ohio, depleted uranium is processed into metallic uranium and cast into cylinders. These castings are shipped to Ashtabula, Ohio, for extrusion and machining to form target cores. The depleted uranium cores are shipped to Savannah River, clad with aluminum and prepared for loading into the Savannah River reactors. In FY 1984 slightly-enriched uranium will also be produced at the feed material facilities for the FY 1985 conversion of a Savannah River reactor to a homogeneous (slightly-enriched) uranium core loading. After irradiation within the reactor, targets are periodically unloaded from the reactors and processed in the chemical processing plant at Savannah River to recover the plutonium for weapon use. Other reactor products used for defense, research, medical and commercial applications are also produced in these reactors.

The N Reactor at Richland uses slightly-enriched uranium fuel to power the reactor and to produce plutonium simultaneously. To obtain fuel for the Richland reactor, the slightly-enriched uranium is converted to metal and cast into ingots at the Fernald, Ohio plant, extruded into cylindrical billets at Ashtabula, and shipped to the fuel fabrication facilities at Richland, Washington. The billets are then simultaneously extruded and clad with zirconium to provide finished fuel elements for the N Reactor. After irradiation within the reactor, the spent fuel is removed and stored temporarily in facilities onsite prior to being processed in the Richland PUREX fuel processing plant. The processing facility at Richland, called the PUREX facility after the Plutonium-Uranium Extraction process utilized, will begin operation in FY 1984 after having been in standby since 1972. Spent fuel from the N Reactor at Richland has been stored since the PUREX facility was shutdown.

Another site for processing spent reactor fuel is the Idaho Fuel Processing Facility within the Idaho National Engineering Laboratory at Idaho Falls, Idaho. While there are no production reactors at Idaho, the facility is used to process fuel from the naval reactors program and other R&D reactors.

Other processing operations, for processing of nuclear materials scrap and nonproduction reactor fuels, are conducted at Los Alamos, New Mexico; Oak Ridge, Tennessee; and Santa Susana, California.

Materials Production - Research and Development (R&D)

Materials Production is performing R&D on plutonium Special Isotope Separation (SIS) technology, with activities at Lawrence Livermore National Laboratory, Los Alamos National Laboratory and TRW. The principal benefit of the plutonium SIS process will be an augmentation of the weapon-grade plutonium stockpile. Another potential benefit of SIS technology is the cleanup of the weapon-grade plutonium already in the stockpile to reduce radiation exposure of personnel involved in the manufacturing and deployment of weapons.

Process research and development is necessary to assure continued, efficient, and safe operation to meet production goals. This effort includes process optimization to maximize production at minimum unit cost, development of alternative production methods to respond to changes in production and product requirements, development of engineering improvements for fuel handling, environmental protection and safety concerns, etc. As the requirements for materials production increase, it is essential to maintain the necessary level of process research and development effort.

	FY 1983 Appropriation	FY 1984 Request
Materials Production	$1,202,760	$1,485,300

The requested level for FY 1984 supports a program which will meet near term national defense and non-defense nuclear materials requirements.

Actions initiated in FY 1983 to increase production which will be continued in FY 1984 include a program to convert selected Savannah River production reactors to a homogeneous (Mark-15) core that is capable of increasing plutonium production. Actions initiated in prior years and expected to be completed in FY 1984 include startup of the L Reactor at Savannah River, and reactivation of the PUREX fuel processing plant at Richland. The conversion of the N Reactor at Richland to the weapon-grade mode of operation was completed in FY 1982 approximately five months ahead of schedule. N Reactor will continue to operate to produce weapon-grade plutonium in FY 1984.

I. Operating Expenses	$ 827,410	$1,125,700
A. Reactor Operations	$ 331,000	$ 497,745

The FY 1984 request for reactor operating expenses provides for operation of production reactor feed plants at Fernald and Ashtabula, Ohio, and Oak Ridge, Tennessee; the N Reactor and fuel fabrication and support facilities at Richland, Washington; and four production reactors (P, K, C, and L), fuel fabrication and support facilities at Savannah River, South Carolina, that are required to meet nuclear materials requirements. The FY 1984 request is $166,745,000 above our FY 1983 level, of which $24,500,000 is attributable to inflation (adjusted for the transfer of L reactor activities from supporting services to reactor operations).

Oak Ridge

In FY 1983, the Fernald, Ohio, Feed Materials Production Center (FMPC) and the Ashtabula, Ohio, Extrusion Plant are scheduled to produce about 1600 metric tons of depleted uranium cores and about 150 metric tons of slightly-enriched uranium test cores for the Savannah River production reactors. About 900 metric tons of slightly enriched uranium billets will be produced for the Richland N Reactor in FY 1983 to support the weapon-grade plutonium production mode.

In FY 1984, the FMPC and the Extrusion Plant will produce about 1150 metric tons of depleted uranium cores and 120 metric tons of slightly-enriched uranium cores for the Savannah River reactors. These production levels are necessary to support the first year of L Reactor operations at Savannah River and the establishment of the required material inventory needed to support steady-state operation of one Savannah River production reactor on a Mark-15 loading to produce (3% Pu-240) plutonium beginning in late FY 1985. Also, 950 metric tons of slightly enriched uranium billets will be produced for N Reactor to support the weapon-grade plutonium production mode. The reduction in depleted uranium core production in FY 1984 reflects the change over of the FMPC and the Extrusion Plant to the slightly-enriched uranium core production mode. An additional $2,400,000 in operating expenses is needed to support these activities.

At the Oak Ridge, Tennessee, Y-12 Plant in FY 1984, about 1500 kilograms of highly-enriched uranium from non-production fuels processed at the Idaho Fuel Processing Facility and about 6200 kilograms of highly-enriched uranium from production fuels processed at Savannah River are to be converted to metal form for reuse as fuels in the Savannah River production reactors and for use in the weapons program. This recycle of recovered highly-enriched uranium conserves virgin highly-enriched uranium recovered from recycled weapons and held in DOE material inventories. About 11,100 kilograms of highly-enriched uranium metal will be shipped to Savannah River to support operation of the Savannah River reactors on Mark 16/31 (plutonium production) and Mark-22 (tritium production) loadings. This represents a 2,800 kilogram increase in highly-enriched uranium deliveries, and requires an additional $1,800,000 funding at the Y-12 Plant.

Richland

The Richland N Reactor will operate in FY 1984 to produce weapon-grade (6% Pu-240) plutonium. The facility will also deliver sufficient by-product steam to the Washington Public Power Supply System to generate up to 4.0 billion kilowatt-hours of electricity for the Bonneville Power Administration power grid, resulting in about $56,000,000 in steam revenues in FY 1984. This is an increase of $25,000,000 above the estimated FY 1983 revenues and results from the recent renegotiation of the steam revenues contract. In support of N Reactor operations, the Richland fuel fabrication facility will produce about 950 metric tons of finished fuel, which is about 50 metric tons above the planned FY 1983 fuel fabrication rate. To support this increase in finished fuel production, and continued steady-state operation of N Reactor in a weapon-grade plutonium production mode, an additional $9,000,000 in operating expense is needed in FY 1984.

In support of resumption of operation of the PUREX fuel processing plant, in FY 1984, fuel must be moved from the fuel storage basins to the PUREX facility. Movement of the fuel includes: sorting and selection of the fuel by isotopic content to meet processing requirements; moving the selected fuel to a specially equipped cooling basin where it is transferred from storage canisters to shipping canisters; transfer of the fuel from the basin to the PUREX facility; and, at PUREX, decapping of the canisters in preparation for charging fuel to the dissolvers. Fuel shipping casks used to move the fuel to PUREX must be decontaminated for reuse. Additional personnel will be required for these activities. An additional $3,500,000 in operating expenses is requested in FY 1984 to support the funding associated with shipment of material from the N Reactor to PUREX.

In FY 1984 an additional $7,600,000 in operating expenses is being requested to continue a productivity improvements program to meet state-of-the-art technology of reactor equipment and components and to meet stricter safety requirements. The goal of this program is to ensure continued safe, secure and reliable operation of N Reactor into the 1990's and to improve the reactor on-line operating efficiency for increased plutonium production and steam revenues. Funds will be used to improve reactor fuel charge/discharge operations which will result in a gain of approximately 12 additional reactor operating days per year. This equates to about $300,000 per day of additional steam revenues. These improvements have a payback of less than two years.

Funding for the production reactor safety improvements program initiated in FY 1981 will increase by $800,000 in FY 1984 to implement the addition of an auxiliary fifth shift of reactor operators.

Savannah River

In FY 1984 Savannah River will operate four production reactors (P, K, C, and L), and fuel fabrication and support facilities. The requested funding level continues support of an additional shift in the fabrication area to meet the high throughput demand requirements of the high-purity (3% Pu-240) plutonium production, Mark-15 programs, and four reactor operations; continues improvements to the reactor operator training program including staffing of a reactor simulator; and provides first year operating funds for operation of L Reactor following its 3 year upgrade and restoration program. Support from a strong onsite technical staff at the Savannah River Laboratory and from the production operating staff continues at an increased level to fulfill the initiatives of post-TMI safety assessments.

The Savannah River fuel fabrication facilities will produce about 3200 metric tons of fuel and target assemblies in support of plutonium and tritium production in the Savannah River reactors. The Savannah River fabrication facilities will provide the fuel and target assemblies needed to support tritium production, high-purity plutonium production in the Savannah River reactors, startup of L Reactor, and will preproduce Mark-15 cores for initiation of partial conversion to Mark-15 operation late in FY 1985. Support continues for an additional operating shift to meet the high throughput demand requirements of the high purity and Mark-15 program, and four reactor operation. In FY 1984, an additional $2,000,000 is needed to fabricate depleted uranium (Mark 16/31) elements for the Savannah River reactors.

Funding is provided for the operation and maintenance of the four production reactors. FY 1984 will be the first full year of operation for L Reactor. The increase over the FY 1983 level includes $65,700,000 for the operation of L Reactor. Initially, L Reactor will be producing plutonium using the Mark 16/31 charge. The reactors will produce weapons materials (Pu-239 with a Pu-240 content of 3% and tritium) and other nuclides (Pu-238 and Pu-242) specified for defense, the space program, and medical and industrial requirements. The following are examples of processes occurring under reactor operations.

1. Final assembly of fuel target and control rod assemblies.
2. Irradiation of the above to produce weapon-grade plutonium, tritium, Pu-238, and other nuclides.
3. Storage of highly radioactive fuel and target assemblies following irradiation.
4. Dissassembly and bundling or bucketing of tubes and slugs in preparation for shipment to the separation areas for processing.

Tritium producing charges will be used as necessary to meet tritium requirements.

Preparations will be made for partial conversion to Mark-15 3% Pu-240 operation in mid-FY 1985. The Mark-15 program has the potential for significant near term increases in the level of plutonium production. In fact, this program should increase plutonium production over the current Mark 16/31 mode of production in the Savannah River reactors, resulting in a gain over the planning period. In FY 1984, an additional $1,000,000 is needed to begin fabricating Mark-15 fuel elements for changeover of one Savannah River reactor in mid-FY 1985.

The blending program, begun in FY 1981, will be continued at approximately the FY 1983 level. Under this program, high purity plutonium is blended with fuel-grade (12% Pu-240) plutonium to increase the availability of weapon-grade (6% Pu-240) plutonium. The large inventory of fuel-grade plutonium makes this program an attractive method of increasing weapon-grade plutonium production within the limited capacity of the existing production reactors.

The production reactor safety improvements program initiated in FY 1981 will be continued including staffing of a reactor training simulator and a strong onsite technical staff at the Savannah River Laboratory and with the operating organizations.

In FY 1984, $34,900,000 in additional funding is required to support Savannah River operating efficiency improvements; scheduled reactor and fabrication area maintenance (P reactor turbine repairs, overhaul of the river water pump, etc.); implementation of the high frequency accounting system for nuclear materials; hiring and training of additional security guards; increased reactor operating costs and reliability measures to ensure continuity of operations. An additional $13,500,000 in other items such as increased hiring and training of replacement staff, vacation accruals, etc., account for the balance of the increase in reactor operations.

	FY 1983 Appropriation	FY 1984 Request
B. Processing of Nuclear Materials	$ 262,150	$ 327,595

For materials processing, the FY 1984 request funds the increasing scope of new activities necessary to supply increased quantities of plutonium and tritium for weapons and R&D programs to assure that resources are available to meet increased nuclear materials defense requirements. Nuclear materials processing activities are carried out at Savannah River, South Carolina; Richland, Washington; Idaho Falls, Idaho; Oak Ridge, Tennessee; Los Alamos, New Mexico; and Livermore and Santa Susana, California. This request for processing operating expenses is $65,445,000 above the FY 1983 level, of which about $19,500,000 is attributable to inflation (adjusted for the transfer of PUREX activities from supporting services to processing of nuclear materials).

Idaho

Recovery of enriched uranium from spent Naval and R&D nuclear reactor fuels will continue through the operation of processing systems at the Idaho Fuel Processing Facility. Funding is provided in FY 1984 for the operation of the spent fuel receipt and storage facilities, operation of the fuel dissolution and solvent extraction systems, operation of the process support systems, and the required engineering, technical, maintenance, and safety support required for these operations. Krypton-85 recovery operations will continue as appropriate fuel is made available.

Fuels will be received from the Naval propulsion program and from experimental research and development reactors for storage and processing. Fuels may also be received from the Ft. St. Vrain reactor for storage. Funding increases are required for the operation of the new fuel storage facility provided under the Fluorinel Dissolution Process and Fuel Storage Facility Project (FAST, 77-13-a). The initial staffing and operation of the large Fluorinel facility for storage of Navy and research fuels amounts to $8,800,000 of the increase in processing for FY 1984.

Operation of the Idaho Fuel Processing Facility plant support systems, e.g., steam plant, utility distribution and maintenance, and heating and ventilation, will continue at required levels. Additional manpower requirements are funded in FY 1984 for the startup and operation of the new steam generating facility provided under the Coal-Fired Steam Generation Facility Project (80-AE-3). This amounts to $2,100,000 of the increase for FY 1984 processing activities.

Cost effective processing of ROVER fuels will increase in FY 1984. Process operations include fuel transfer from the Graphite Storage Facility, fuel charging to the primary burner and ash dissolution followed by solvent extraction and purification. Approximately 1650 kilograms of uranium-235 valued at approximately $80,000,000 is scheduled for processing in FY 1984. This is an increase over FY 1983 of about 600 kilograms of uranium-235.

Richland

Reactivation activities at the PUREX fuel processing plant were initiated in 1981. Spent fuel from N Reactor which has been placed in storage since 1972 will be processed in the PUREX and uranium oxide plant facilities to recover plutonium and uranium. The stored fuel contains both weapon-grade and fuel-grade plutonium. Both grades will be separated and converted to plutonium oxide in PUREX. Weapon-grade material will be shipped to the Los Alamos National Laboratory for conversion to the metal form required for weapon use, while the fuel-grade plutonium will be sent to Savannah River as required to be blended with high-purity plutonium to increase the supply of weapon-grade plutonium. Fuel for processing will be preselected to yield the maximum quantity of weapon-grade product, including that obtained with and without blending. The target date for PUREX operation is April 1984. The funding requested in FY 1984 is expected to permit the startup of PUREX a few months earlier. About 100 kilograms per month additional plutonium could be produced by the earlier start. All of the plutonium, both fuel-grade and weapon-grade, is required to meet defense programs requirements. The initial staffing and operation of the PUREX fuel processing plant comprises $25,000,000 of the increase in processing for FY 1984 with a reduction in supporting services due to the completion of reactivation activities.

The FY 1984 request includes an increase of $5,600,000 to allow the Plutonium Finishing Plant (Z Plant) to begin operating the Plutonium Recovery Facility and the Oxide Line for the recovery of plutonium from scrap inventory and that generated during terminal cleanout. The recovered plutonium will be utilized to increase the plutonium availability for weapon production. Shipment of fuel-grade product from Z Plant to Savannah River for blending with high purity plutonium to produce weapon-grade plutonium will be continued. The operation of the Plutonium Recovery Facility and Oxide Line will provide 400 kilograms of plutonium recovered from scrap for the blending activity in FY 1984.

Savannah River

All spent fuel and targets from the Savannah River production reactors are processed in chemical separations facilities at Savannah River. The plutonium, tritium, neptunium and other materials produced for defense programs, commercial sales and research and development are separated and made available for their intended use. Residual enriched uranium is recovered for recycle in reactor fuel at a higher rate than in FY 1983. Plutonium and tritium are required for defense program activities. Plutonium-238 and other isotopes are used in defense programs as well as in government research and development and the private sector.

Separated high-purity plutonium produced at Savannah River will be blended with fuel-grade plutonium to produce weapon-grade plutonium to meet requirements as needed. Blending is the most cost-effective means of increasing the supply of weapon-grade plutonium. During FY 1984, the first of the fuel-grade plutonium from the PUREX facility at Richland will be received and blended at Savannah River. Tritium requirements will be met through increased separation of new production material and purification of recycled material. A funding increase of $12,000,000 is necessary to implement increased processing activities to provide nuclear materials to meet Nuclear Weapons Stockpile Memorandum requirements.

Obsolete and deteriorated plutonium-238 processing facilities are located in the H chemical processing plant. The deteriorated facilities are hazardous to the continued operation of the plant from an accidental radioactive contamination and fire risk viewpoint. FY 1984 funding provides an increase of $1,800,000 to initiate dismantling of these facilities to make space available for high priority activities.

The cost effective recovery of plutonium-239 and plutonium-238 from scrap is managed by the Central Scrap Management Office at Savannah River. This office has established a computerized data base incorporating all declared scrap data for plutonium-239. This automation is a significant improvement over the previous manual system and has resulted in greater management effectiveness. The scrap plutonium is processed chemically to recover the plutonium-239 and plutonium-238. The recovered nuclear materials are utilized by DOE in meeting its requirements. This recovery activity is very cost effective compared to new production.

Special Isotope Separation Research

The Department has been conducting research and development on plutonium Special Isotope Separation technology. The request of $40,000,000 is a decrease of $19,000,000 in operating expenses over FY 1983. This decrease reflects the assessment by the Administration that a somewhat longer period of research and development is needed before the construction of a demonstration facility. It will enable Lawrence Livermore and Los Alamos National Laboratories to continue experiments begun in FY 1982, and would support demonstration of plutonium Special Isotope Separation technology on a prototype scale in FY 1986. In addition, the request will enable the production sites to complete the preliminary design of the facilities and equipment needed for a plutonium Special Isotope Separation pilot facility.

Other Sites and Activities

Funding in FY 1984 for Los Alamos National Laboratory provides for continued cost-effective processing and recovery of plutonium-239 from the backlog of scrap materials to meet defense and research requirements.

Two new activities at Los Alamos will comprise $9,600,000 of the increase in processing in FY 1984. First, Los Alamos will receive plutonium oxide from the operation of the PUREX processing plant in Richland and convert the oxide to metal for weapons production. An increase of $5,800,000 provides for the initial staffing and operation of the plutonium conversion equipment. Second, in FY 1984 the Materials Production Program will assume the plutonium oxide conversion effort previously budgeted by Nuclear Energy. This effort consists of purifying plutonium material and preparing plutonium oxide of high chemical purity used for testing in fuel assemblies for plutonium-fueled reactors. An increase of $3,800,000 provides for this increased plutonium processing.

The FY 1984 request includes nonproduction fuel decladding activities at Santa Susana, California, that provide cost effective recovery of high-purity plutonium. Activities of the uranium (primarily uranium-235) Central Scrap Management Office will be increased at Oak Ridge, permitting the processing of the inventory of weapon-grade uranium scrap for the cost-effective recovery of highly-enriched uranium. Small quantities of uranium-233 scrap will be processed to a safe and storable product.

	FY 1983 Appropriation	FY 1984 Request
C. Supporting Services	$ 220,260	$ 212,860

Supporting services are essential to maintain the production sites' operations at their increased levels and to continue the initiatives to increase production of nuclear material for national defense. These important activities support all site operations as well as new or improved production capabilities, such as, the facility restoration program, the New Production Reactor, tritium production R&D, and others. Increased funding is also required for prior year initiatives such as the FAST facility which is in the final stages of preparation for operation.

The FY 1984 estimate for supporting services is $7,400,000 below the FY 1983 request due to the completion of activities for L Reactor startup and PUREX reactivation and their conversion to operational status. Decreases for these two activities of $36,500,000 are partially offset by increases in other portions of supporting services. Of the increases, $12,900,000 is attributable to inflation (adjusted for the transfer of L Reactor and PUREX to operational status).

General

FY 1984 funds provide for the startup, shutdown, and standby costs relating to production facilities which will be needed either to meet current material requirements or for anticipated or possible future requirements. Other supporting services activities include production of lithium and uranium metals for weapons; transportation and security shipments; conceptual engineering studies; safety, environmental and safeguards costs; long-range nuclear materials management planning; general site safety improvement activities; warehousing; funding of inventories such as common use stores, process spares, and production of other nuclear materials inventories; and miscellaneous contractor activities such as award fees, employee group insurance, and employee pension funds.

Funds are included for the Savannah River Laboratory to perform technical development activities in support of the operation of nuclear materials production facilities at Savannah River. During FY 1984 these activities will include: R&D on improvements in reactor safety; continued development of safety analyses that conform to national standards; and application of criticality analyses to specific process configurations.

The facility and process safety analysis review program at Los Alamos National Laboratory, necessary to meet agency requirements for independent review and analysis of safety for new and modified production facilities, will continue in FY 1984.

Procurement of process spares equipment in FY 1984 is essential to assure continued plant operations in the event of equipment failure, especially reactor fuel fabrication, fuel processing, and reactor refueling.

Reactor Operations Support

The FY 1984 funding for Savannah River provides an additional $3,900,000 for common use stores and process spares inventories to support reactor operations. This includes acquisition of additional process spares and common use stores to support L Reactor operation and to support recent changes and additions in reactor equipment as a result of restoration and upgrade programs to improve productivity. An additional $1,000,000 is needed to support a Savannah River

Laboratory study on utilizing robotics. This study will identify areas of possible applications and evaluate the costs and benefits of robotics. Activities are continued for reworking heavy water used by the Savannah River production reactors to conserve the agency's inventory.

At Richland, procurement of zirconium, a funded inventory, will be continued to support the increased finished fuel fabrication effort required to operate N Reactor on a weapon-grade plutonium production mode. Improvements will also be made in inventories of spare parts for old and often obsolete reactor components. Delays in obtaining some critical spares could shut down the reactor for as long as six months. On average, this program should add a minimum of two or three reactor operating days per year while avoiding the chance of extended outages. The FY 1984 request for Richland includes an additional $2,000,000 to provide for zirconium and spare parts inventories essential for continued N Reactor operation.

N Reactor safeguards and security will be upgraded in FY 1984. A $2,000,000 increase is needed to suport the planned safeguards upgrading recommended by DOE Headquarters assessments, a DOD material systems analysis survey, and a Sandia National Laboratory assessment.

The FY 1984 technical development funds at Richland include those costs associated with development of new and improved processes for fuel fabrication and irradiation activities. Funding provides for continuing investigation into end-associated fuel failures, activated corrosion product behavior in the reactor primary coolant, N Reactor life capability and enhanced non-destructive examination methods to improve surveillance and inspection of equipment. These efforts are resulting in procedure changes for improving primary coolant water chemistry control and in specific projects, such as, a magnetic filter installation to reduce personnel exposure during primary system maintenance.

At Oak Ridge, an additional $2,000,000 will be used to support an increase in lithium compound production, an increase in heavy water utilization at the Oak Ridge Y-12 plant, and an increase in production of depleted uranium compounds to metal billets for use in the weapons program.

The continued production of tritium is, and will remain, vital to maintaining the nuclear weapons stockpile. Since tritium has a half-life of 12.3 years, the tritium inventory decays at a rate of 5.5 percent per year. Tritium is produced in the production reactors at Savannah River. Although specific failure mechanisms that would limit the lifetimes of the production reactors at Savannah River have not been identified, these facilities are now about 30 years old. Since it would take about 10 years before a new reactor can be designed, constructed, and put into a production mode, the Savannah River reactors will have to be the primary source of tritium until they are about 40 years old. In spite of the extensive restoration of these reactors currently in progress, there is always an increasing probability over time that they could become unavailable.

A New Production Reactor would help ensure the availability of tritium to meet program requirements during the late 1990's and into the next century. The FY 1984 request provides an additional $3,000,000 over FY 1983, for a total of $5,000,000 for activities to support an initial safety review, site characterization, and the technology verification.

The FY 1984 budget will provide an increase of $4,000,000 to Savannah River and Richland to continue tritium production research and development efforts related to providing a backup tritium production capability.

Materials Processing Support

Prior to resumption of processing operations at Richland, PUREX reactivation activities will be funded within the supporting services account. Up to six months of reactivation activities for PUREX are expected in FY 1984, to be followed by production operations. With the need for plutonium product from PUREX, every effort will be made to initiate processing as early in FY 1984 as possible. Processing support activities will continue at a lower level after PUREX operation is initiated to assure a smooth sustained operation after more than eleven years of facility down-time and to provide studies for extended PUREX processing capability. PUREX processing support will also include safety assessments, safeguards and security activities and procurement of process spares for facility systems to insure uninterrupted operation.

Requested FY 1984 funding provides for support activities necessary to assure continued near term processing capability at the Idaho Fuel Processing Facility. Included in these activities are the conceptual design and engineering studies for future materials processing projects. A conceptual design effort in FY 1984 is the proposed fuel processing facilities restoration project. Activities to initiate restoration of the Idaho Fuel Processing Facility amount to $5,000,000 of the FY 1984 supporting services request. Supporting activities include establishing operational requirements for new or modified facilities and the procurement of process spares for plant systems.

Funding for startup activities is also included under the supporting services category. In FY 1984, systems operational testing, operator training and remote mockup work will increase significantly to support the planned startup for the processing segment of the FAST facility in March 1985. Other projects requiring additional startup funding for systems testing and development of operating procedures are the Remote Analytical Facility Upgrade and Expansion project (81-D-131) and the Fuel Processing Facilities Upgrade project (82-D-136)

Processing support funds will also be utilized to complete conceptual design for a proposed processing facility modification at Richland. The facility modification will augment PUREX's processing capability by providing for the Shear/Leach dissolution of various DOE-owned plutonium bearing fuels, e.g., Fast Flux Test Facility spent fuel. Fast Flux Test Facility fuel contains 3.5 metric tons of Defense Program origin fuel-grade plutonium. FY 1984 funding is a decrease of $3,100,000 from FY 1983 for this activity.

With an expanding base of materials processing activities, there is also a need for development activities in support of materials processing operations. This processing support includes process and engineering improvements for handling and processing of production fuels, non-production fuels and future production fuels. All materials processing support activities contribute significantly to the processing of nuclear materials for defense and other programs.

The Oak Ridge National Laboratory continues the activity to convert the Consolidated Edison U-233/U-235 solution to a safe, storable form. In addition, Oak Ridge, as the National repository for U-233, will process small quantities of U-233 scrap and will utilize the recovered material to meet DOE requirements.

Restoration

With the completion of N Reactor Cell 5 retubing in FY 1983, the operating expense request for facility restoration has declined by $3,600,000. The facility restoration activities are in the fourth year of a program that is planned to be funded over a 6 year period. The facility restoration program will increase the productivity of the agency's production complex, separations processes, and supporting plant services. Without the program, these facilities, now about 30 years old, would continue to deteriorate. FY 1984 operating funds will be used for quality assurance and operations liaison tasks associated with the overall program and cost funded repairs. At Savannah River repairs will be made to existing precipitators, transfer stations, steam turbines, agitators, centrifuges, collectors, and other production components.

	FY 1983 Appropriation	FY 1984 Request
D. Enriched Material	$ 0	$ 70,000

The FY 1984 request of $70,000,000 will provide $20,000,000 for separative work for the fuel necessary to operate N Reactor, and $50,000,000 for separative work to initiate partial (less than a full year) conversion of one Savannah River reactor to a Mark-15 core loading for producing high-purity plutonium in late FY 1985. Operation of the Savannah River reactors at the high-purity plutonium allows the necessary material for blending for maximum production of weapon-grade plutonium. Conversion of the Savannah River reactors to a Mark-15 core loading will increase plutonium production for the system.

E. Program Direction	$ 14,000	$ 17,500

The FY 1984 request for program direction provides for salaries, benefits, travel and program direction support for headquarters staff at Germantown, Maryland, and for the Richland and Savannah River Operations Offices. The request provides funding for 333 full-time equivalents of which 54 are for DOE headquarters staff, 2 for the Richland Operations Office, and 277 for the Savannah River Operations Office. The FY 1984 request is $3,500,000 above the FY 1983 appropriation. However, it is only $1,700,000 over the FY 1984 Base level of $15,800,000. The Base level reflects additional FY 1983 funding required to support additional staffing that has been provided to accomplish new and enlarged activities and responsibilities resulting from upgraded safety policies and standards relating to nuclear facility operation. These activities include environmental, safety and health appraisals, preparation and review of safety analysis reports, reactor safety reviews, nuclear facility safety reviews, occupational safety, environmental protection, and quality assurance program implementation and surveillance.

Headquarters

The FY 1984 request of $2,875,000 for program direction at Headquarters is $535,000 above the FY 1984 Base funding level. This funding provides for salaries, benefits, and travel for 54 full-time equivalents at the facility in Germantown, Maryland including four positions in the Office of the Deputy Assistant Secretary for Nuclear Materials. This represents an increase of nine full-time equivalents from the FY 1983 staffing level.

The staff devotes primary attention to such activities as:

- Program direction, management, and overall support;
- Development of program goals, objectives, and plans consistent with Administration policy;

- Formulation and justification of the proposed budgets and program initiatives to the Office of Management and Budget and the Congress;

- Conduct of management reviews, technical reviews, safety evaluations and other studies, analyses, and evaluations to assure program accomplishment to continually optimize technical, managerial and economic aspects of the program; and to assure effective, efficient, safe, secure, and environmentally acceptable program operation;

- Coordination of program with other agency programs, other Federal agencies, the Office of Management and Budget, the Congress, the United Kingdom, and other allies, field offices, and numerous contractors.

Other staff activities include responses (briefings, meetings, correspondence, etc.) to inquiries from Congress, government agencies, foreign governments, special interest groups, private industry and the public. Other areas integrated into the program, which require special and increasing staff attention, include Special Nuclear Material safeguards, transportation and site security, intelligence consultation, DOE operational security, classification (new guides and Section 148, Atomic Energy Act of 1954), as amended, quality assurance, nuclear and occupational safety, environmental protection, health and safety of the public and independent environmental protection, safety, health protection and quality assurance overview. All of these ancillary activities require substantial headquarters manpower.

Additional staff is needed in FY 1984 and beyond to correct the current shortage of personnel and to support the new production initiatives. This support is needed in areas of program policy, planning, implementation, budgeting, and quality assurance and safety; and is crucial to the successful achievement of the DOE national security program objectives. The nine full-time equivalents are required to effectively carry out the initiatives included in the FY 1984 budget request. New initiatives begun or expanded in FY 1981 and continued into FY 1984 include: L Reactor upgrade for subsequent restart at Savannah River; PUREX processing plant reactivation at Richland; N Reactor conversion to weapon-grade plutonium production at Richland; production of high purity plutonium for blending at Savannah River; expansion of Special Isotope Separation activities; the Facility Restoration Program; the New Production Reactor; reactor safety improvements; increased security improvements; startup activities for the new FAST Facility for Navy spent fuel receiving and processing at Idaho; ROVER fuel processing at Idaho; and increased feed material production activities at Oak Ridge to support these initiatives. Additional staffing will also be required to implement revised nuclear safety environmental protection, health and quality assurance directives.

Savannah River

The FY 1984 program direction request of $14,625,000 for the Savannah River Operations Office is $1,165,000 above the FY 1984 Base funding level. This funding provides for the salaries, benefits, travel, and support services of 277 full-time equivalents. This represents an increase of 13 full-time equivalents above the FY 1983 staffing level.

The Savannah River Operations Office is responsible for the direction and oversight of the Nuclear Materials Production, Weapons Activities, Defense Waste and Byproducts Management and Naval Fuel Materials Facility programs at the Savannah River Plant, which currently employs about 9,800 contractor personnel. By 1984, the number of contractor employees is expected to increase to more than 11,000. The Savannah River Operations Office provides the major support for conduct of materials production activities and accounts for about

50 percent of the annual Nuclear Materials Production Program funding. Office personnel were charged with the administration of 1,000 different contracts in FY 1982. This will increase to an estimated 1,450 in FY 1984. The programmatic and administrative management required to protect the government investment in a site of this size is in itself an enormous undertaking.

The Savannah River Plant operates three nuclear production reactors with a fourth reactor (L) scheduled for restart in FY 1984. These reactors are supported by fuel and target fabrication, chemical processing, and radioactive waste storage facilities. Activities begun or expanded in FY 1981 and continued into FY 1984 include the upgrade and operation of L Reactor, production of high-purity plutonium for blending, facility restoration, reactor safety improvements, development of new and more efficient methods to increase nuclear materials production, increased security efforts and methods, and numerous activities covering the health, safety, security and environment of the Savannah River Plant operations. Design will be continued and construction will be initiated in FY 1984 on the Defense Waste Processing Facility which will lead to solidification of high level radioactive waste beginning in 1989. This activity is supported in the budget of the Office of Defense Waste and Byproducts Management. Construction activities for the fuels and manufacturing facility in support of Department of Defense and Department of Energy Naval Reactors program responsibilities will also continue in FY 1984.

The increase of 13 full-time equivalents for Savannah River from FY 1983 to FY 1984 is necessary for new programs coming on line and to meet the requirements of new nuclear safety orders. The additional positions will be utilized to support major activities such as the Defense Waste Processing Facility construction as well as general engineering support for the other significant construction activities underway. In addition, staffing will be needed to support the environmental activities as impacted by the construction projects and the new programs which will be operating. The need for additional manpower due to the existing and new nuclear safety orders has been well documented and the additional staffing will provide some relief in that area.

	FY 1983 Appropriation	FY 1984 Request
II. Capital Equipment	$ 107,700	$ 102,500

With the beginning of PUREX fuel processing and L Reactor operation in FY 1984, operations requiring equipment repair and replacement will be increased over FY 1983. Reactor and processing operations utilize large, unique, and expensive items of equipment. In the corrosive environment of fuel processing facilities, stainless steel or equivalent material resistant to corrosion must be used. And because of the high radiation levels in the processing facilities, equipment must be specially designed for remote in-place maintenance and removal. Nevertheless, the FY 1984 capital equipment request is substantially less than 1 percent of the total investment in the nuclear material production facilities and a slight decrease from the FY 1983 level.

Equipment is repaired and maintained to assure a high level of operation. When replacement parts are no longer available for the installed equipment (up to thirty years old), modern replacement equipment should be procured, installed, and integrated into the remainder of the process systems. However, in many instances, old equipment must be repaired and irreplaceable parts must be fabricated on site, an expensive and inefficient alternative.

Major computer items included in our request are for upgrade of the IBM 3081 processor ($1,200,000) and acquisition of additional direct access storage ($500,000) to support Savannah River operations.

Reactor Operations

Capital equipment funds will be used to support full operation of the four reactors at Savannah River, and N Reactor at Richland. The major portion of the increased funding for N Reactor will provide an inventory of key spare equipment items to assure sustained operability. Oak Ridge funding supports the reactor feed plants at Fernald and Ashtabula, Ohio, and the Y-12 Plant at Oak Ridge, Tennessee.

An example of capital equipment included in our FY 1984 request for the reactor facilities is the installation of equipment for remote hookup of cooling water to the reactor charge and discharge machines at Savannah River. Manual connection of the cooling water is now required for each charge and discharge operation. The new system will enable remote cooling water hookup to the machines to eliminate the need for personnel entry to the reactor process room for performance of a manual operation and thus avoid unnecessary radiation exposure to personnel. Cooling of fuel and target components is essential to prevent melting which could lead to release of radioactive contamination during refueling.

Materials Processing

Major pieces of equipment in processing facilities at Richland, Savannah River, and Idaho cost hundreds of thousands of dollars each. A cost effective inventory of thousands of selected, critical spare parts must be maintained for installation on short notice to minimize costly downtime and processing outages. Sustained operation increases production and contributes to meeting material requirements. Major processing facilities requiring significant equipment expenditures are the Idaho Fuel Processing Facility; the F canyon and H canyon at Savannah River; and the PUREX facility, Uranium Oxide Plant and Z Plant at Richland.

Continuous evaporators illustrate the function and magnitude of some processing equipment. Evaporators are used to concentrate solutions prior to further processing. The tube bundle in the evaporator vessel heats the solution to boiling, and the steam which evolves during boiling is condensed and routed to another tank or vessel. Three major equipment items in evaporation are: (1) the evaporator vessel; (2) the tube bundle; and (3) the condenser. Since evaporation is conducted in a corrosive environment, the equipment is constructed of stainless steel. These major equipment items cost up to $850,000 each and require two to three years for fabrication and delivery. Tube bundles, condensers, and evaporators, all of which experience periodic failure, will be procured in FY 1984 to have in hand for replacement and thus assure continuous processing. Other major items of equipment in FY 1984 include fuel dissolvers, fuel storage racks, vessels, and process instrumentation.

Special Isotope Separation

Capital equipment will be procured to support operation of the Lawrence Livermore National Laboratory plutonium Atomic Vapor Laser Isotope Separation Process Demonstration System (prototype system) and the Los Alamos National Laboratory plutonium Molecular Laser Isotope Separation Process Development Module (prototype system).

Site General

Finally, capital equipment is procured to support plant-wide activities at all of the production sites. Such equipment is also required to provide for health, safety, environment, and safeguards concerns. Major capital equipment is needed at Savannah River for cooling tower fans, motors, and gearboxes. These cooling towers provide cooling for building air conditioning and process equipment. Maintenance costs have become excessive and replacement is necessary to continue operations. Another example of capital equipment needs is the replacement of multi-port valves for the production of steam and electricity cogeneration to support all site operations at Savannah River. These valves have reached the end of their useful lifetime and require replacement to ensure continued reliable operation.

	FY 1983 Appropriation	FY 1984 Request
III. Construction	$ 267,650	$ 257,100

The FY 1984 request for construction is $10,550,000 below the FY 1983 appropriation, and is based on supporting continuing production activities. This level will provide for:

- Prior year projects at various levels;
- General support, e.g., General Plant Projects and Plant Engineering and Design, various locations;
- Continued facility restoration at various locations;
- PUREX fuel processing plant improvements in support of reactivation at Richland;
- Production reactor safety projects at Savannah River and Richland;
- Modification of processing plant utility substations at Savannah River required to meet increasing nuclear material processing requirements;

Detailed information on individual construction projects is included in the Construction Project Data Sheets.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECTS OVERVIEW
Materials Production
(BA in $000)

Project Number	Project Title	TEC[a]	FY 1983 Appropriation[b]	FY 1984 Request
84-D-125	General Plant Projects, VL	$ 31,000	$ 0	$ 31,000
84-D-126	Plant Engineering and Design, VL	2,000	0	2,000
84-D-130	Modification Processing Facility Substation, SR	6,600	0	5,600
83-D-135	General Plant Projects, VL	26,000	26,000	0
83-D-136	Plant Engineering & Design, VL	2,000	2,000	0
83-D-138	PUREX Filter Systems Improvements, RL	12,750	4,250	8,500
83-D-142	Fuel Dissolver Off-Gas Transfer and Treatment System, IFPF, ID	7,600	3,500	4,100
83-D-146	Water Pollution Control, FMPC, OR	9,500	1,400	4,000
83-D-147	Pollution Discharge Elimination, SR	9,650	1,000	2,000
83-D-148	Non-Radioactive Hazardous Waste Management, SR	22,100	1,000	3,000
83-D-180	Facility Storage Modification, VL	15,800	9,300	6,500
82-D-118	N-Reactor Plant Security & Surveillance, RL	4,400	500	2,400
82-D-124	Restoration of Production Capabilities, Phase II, III, & IV, VL	315,000	89,700	118,600
82-D-126	Reactor Safety & Reliability, VL	62,700	9,000	6,000
82-D-127	Safeguards Improvements, SR	34,600	1,000	7,000
82-D-128	Plant Perimeter Security Systems Upgrade, IFPF, ID	5,400	0	3,000
82-D-136	Fuel Processing Facilities Upgrade, IFPF, ID	46,000	17,500	18,000
82-D-201	Special Plutonium Recovery Facilities, JB-Line, SR	65,800	11,000	26,000
81-D-126	Pollution Abatement Facilities - Chemical Processing Plants, RL	5,300	2,700	0
81-D-128	Restoration of Production Capabilities, Phase I, VL	50,400	15,100	0
81-D-131	Remote Analytical Facility Upgrade and Expansion, IFPF, ID	28,500	10,500	2,000
81-D-142	Steam Transfer Header, SR	18,400	5,500	7,400
81-D-143	L Reactor Upgrade, SR	134,000	36,500	0
81-T-502	Special Isotope Separation Laboratory, LLNL (subsequently 82-D-202)	25,000	7,200	0
80-AE-2	Replace Obsolete Processing Facilities, HB-Line, SR	19,000	3,000	0
77-13-a	Fluorinel Dissolution Process and Fuel Receiving Improvements, IFPF, ID	199,400	10,000	0
TOTAL			$267,650	$257,100

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a/ Excludes CP&D and/or PE&D funds.

b/ Includes the return of $16,000,000 from the L Reactor Upgrade Program to projects 82-D-118 ($500,000), 82-D-124 ($2,000,000), 82-D-126 ($2,000,000), 82-D-127 ($1,000,000), 82-D-136 ($3,500,000), 81-D-128 ($5,000,000) and 81-D-131 ($2,000,000). FY 1982 funds identified above were reprogrammed to project 81-D-143.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 84-D-125

3. Date A-E Work Initiated: 1st Qtr. FY 1984

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 4th Qtr. FY 1987

5. Previous Cost Estimate: None
Date:

6. Current Cost Estimate: $31,000
Date:

7. Financial Schedule (Prior year projects shown for comparative purposes)

		Costs			
Fiscal Year	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior Year Projects	$ XXX	$10,661	$ 6,414	$ 1,190	$ 2,492
FY 1982 Projects	20,000	3,142	8,011	4,207	4,640
FY 1983 Projects	26,000	0	5,200	7,000	13,800
FY 1984 Projects	31,000	0	0	5,000	26,000

8. Brief Physical Description of Project

This project provides for various items of new construction; additions, alterations, and retirements to the land, buildings and utility systems at Savannah River, Richland, Idaho, Oak Ridge, Albuquerque, and San Francisco to support program needs in the areas of health, safety, environment, safeguards, general support, materials production program needs; and other program requirements of the department.

Savannah River	$14,620
Richland	9,500
Oak Ridge	1,180
Idaho	3,200
Albuquerque (LANL)	1,000
San Francisco (LLNL)	1,500
Total Materials Production Program	$31,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project

Although it is difficult to provide a detailed description of this type of project in advance, listed below are examples of subprojects under consideration. In general, the estimated cost given for each of the listed subprojects is preliminary in nature and primarily indicative of the size of the project. It should be noted also that the continuing study of requirements will result in some of the projects being changed in scope or postponed, or other projects being added, all depending on conditions or situations not apparent at this time.

Savannah River $14,620

Floor Drainage Piping, 484-D .... $ 400

Presently high pressure turbine drains, boiler feed pump cooling water, etc., drains into this system. In some areas the water blows out of adjacent drains and leaves hot standing water. This project will provide improvements to a situation which is both a housekeeping and environmental protection safety hazard.

Replace Deepwells (3), G Area .... $ 1,000

Due to the age of the wells, failure is expected in the near future. In order to ensure continuous and reliable service, and availability of water, three wells should be replaced.

Replace Roof Ventilators, 321-M .... $ 375

These fans, which were installed in 1957, provide the main building process area ventilation. They have been in service for 25 years and require considerable attention now. One or more units are out of service at anytime for repairs (belts, shaft, bearing, motor, etc.). We expect the current poor condition to deteriorate further and propose replacement with more efficient units.

H & WGVC, Improve Ventilation, 221-H .... $ 360

Hot and Warm Gang Valve Corridors (H & WGVC) are approximately 10 feet high, 12 feet wide and 645 feet long and are considered as radiation danger zones within the 221-H fuel processing building. Temperatures range up to 120°F in these areas. Protective clothing must be worn in these areas for maintaining steam lines, valves, traps, and condensate headers associated with operating facilities. The existing air conditioning is inadequate to provide ventilation and remove sufficient heat to make general working conditions acceptable. This project will provide funds required to improve ventilation and reduce the temperature in the gang valve corridors to an acceptable working level.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Air Condition 2nd and 3rd Levels, 221-F .... $ 240

Air conditioning of the 2nd and 3rd levels of the 221-F fuel processing building is required to meet National Institute for Occupational Safety and Health recommended work space for environmental limits. Air conditioning is also required to meet factory recommended operating temperatures for certain electronic instruments.

High temperature and humidities on the 2nd and 3rd levels make working conditions unreasonably severe. It is desirable to cool these areas with conditioned air for health and safety of operating personnel and to maintain instrument reliability.

Technical Area Utility Additions .... $ 750

Construct additional utility services to provide additional capacity for electrical power, compressed gases, process water, domestic water and steam for office and laboratory use in the Technical Area. All present utility services have reached full capacity and cannot support forecasted programs.

Technical Area Temporary Office Building .... $ 400

These funds will provide foundation and utilities for a temporary building. The building will provide 28,000 square feet of office space for 160 persons now located in temporary trailers which are nearing the end of their useful life.

Cooling Systems, 784-A and 284-H .... $ 300

Temperatures in the powerhouses exceed 100°F during the summer months. This has resulted in personnel health and safety hazards. These areas need to be upgraded to meet all heat stress standards and to reduce the potential for personnel injury.

Office Building, 200-H Area .... $ 890

These funds will provide for construction of an office building to replace temporary trailers nearing the end of their useful life which are currently used to provide office facilities for approximately 40 employees.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Heating and Ventilation Control System, 703-A .... $ 700

The air conditioning system controls for all wings of 703-A are worn, inefficient and obsolete. Replacing the controls and coils of these units will provide sufficient and energy efficient cooling.

Perimeter Systems, 703-A .... $ 750

Replacement of the 703-A Administration Building Heating, Ventilation and Air Conditioning (HVAC) equipment and valves will restore the air conditioning system to a reliable and efficient condition.

Permanent Building for T&T .... $ 500

Construction of a building is required to provide 5,000 square feet of office space for use by the Traffic and Transportation Department. The building will be located near 716-A.

Electrical Substation, 235-F .... $ 850

These funds are needed to provide for a 750 KVA electrical substation and emergency diesel. Currently, conditions exist where normal power cannot be provided during periods of peak power use.

Permanent Building for Waste Management Office (WMO) .... $ 500

These funds are needed to construct a building which will provide 5,000 square feet of office space for use by WMO. The building will be located near 702-F.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Provide Foundation and Utilities for H Separations Area Lease-Purchase Building .... $ 500

These funds will provide a foundation and utilities for a lease-purchase building. The building is 32,500 square feet and will replace temporary trailers in H Separations Area which are nearing the end of useful life.

Provide Foundation and Utilities for F Separations Area Lease-Purchase Building .... $ 400

These funds will provide a foundation and utilities for a lease-purchase building. The building is 25,000 square feet and will replace the nine office trailers in F Separations Area which are nearing the end of useful life.

Technical Area Warehouse Addition .... $ 750

The existing warehouse is filled with materials and equipment. Material is also stored in Building 773-A. A new, properly designed warehouse would relieve the overcrowded conditions and release space in Building 773-A which is needed for laboratory/experimental type work.

Unloading Dock, 773-A .... $ 250

These funds are needed to construct a dock at Building 773-A for loading and unloading material between trucks and the building. The existing facility is located in a small courtyard accessible by backing approximately 200 feet and will accommodate small trucks only.

Minor Projects, each $75,000 or less .... $ 3,570

A continuing need exists for capital improvements, each costing $75,000 or less, to general Plant facilities to assure continued safe operation of Plant structures and utilities. An estimate of $25,000 is included in this project for the Savannah River Forest Station (SRFS) to fund minor modifications and improvement of existing facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Projects with a TEC of $100,000 - $200,000 .... $ 1,135

Instrumentation and Control Facility, 235-F	$ 150
Fire Safety System, 285-F&H	125
Barricade Wells, 905-6, 7 and 9C	100
Provide Additional Laboratory Space, 735-A	200
Clean Laboratory Renovation, D-Wing, 735-A	190
Renovation of Laboratory, 704-U	180
Building Addition to Heat Transfer Laboratory for Hydraulic Equipment Removal	190

Richland .... $ 9,500

Miscellaneous Capital Work Orders .... $ 1,130

These are miscellaneous jobs of a capital nature, which are necessary to maintain continuity of operation, safety, and protection of the environment, and to provide safeguards for the protection of life and property. Such jobs would include additions, improvements, and replacements, of structures, building services, utilities, and associated equipment.

Auxiliary High Efficiency Particulate Air (HEPA) Filters - 221-T ....$ 600

A backup filter system is needed for the 221-T canyon roof exhaust. Presently, if the HEPA filters fail or are taken out of service, there is no secondary filtration for the roof exhaust to minimize the spread of radioactive contamination. In addition, it should be noted that there is no backup for the sand filter. If the sand filter should fail, then a demand would be placed on the roof filters and a support system for the roof would be necessary for providing a safe operation of exhausting the T-Plant canyon. The new filters would work in conjunction with the existing system as a backup unit.

Electrical Switchgear Upgrade - PUREX Plant.................... $ 850

This project will provide certain new electrical switchgear at the PUREX Plant to upgrade equipment that has exceeded its original design life and is becoming deteriorated unreliable and unmaintainable. The new switchgear will involve 480 volt and 2400 volt electrical services providing power to operate process and building systems including supply and exhaust air fans.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

PUREX Plant Headend Capacity Increase - E-Cell .... $ 900

This project will provide equipment and instrumentation improvements for the PUREX Plant headend that will improve the peak processing rate through this rate-limiting step by up to 50%. This improvement will match headend throughput to the existing solvent extraction capacity.

Process Control Instrumentation Upgrade - PUREX Plant.. $ 900

This project will provide for upgrades to the headend process control system at the PUREX Plant. Modern electronic process control equipment to replace and augment existing controls will be provided. This upgrade will improve operation and safety.

Replacement of Liquid Cooled Instrument Transformers - 105N .... $ 300

Funding for this project will provide for the removal and replacement of the two 112.5-kVA Polychlorinated Biphenol (PCB) transformers located in the electrical cable distribution and switchgear center in the N Reactor Building. They will be replaced with two new oil-filled transformers and primary 5-kV circuit breakers. The new transformers will be installed outside of the 105-N Building.

The existing PCB-filled transformers have the potential to render the N Reactor Control Room uninhabitable in the event of a PCB leak or fire. The purpose of removing these PCB-filled transformers from the Control Room environment envelope and replacing them with oil-filled transformers and associated equipment, located outside of the 105-N Building, is to eliminate this risk and thereby improve the habitability of the N Reactor Control Room.

100-N - Briefing Center .... $ 600

The N Reactor has provided over 18 years of service to the nation under the Department of Energy and its predecessors. As Hanford moves into direct support of national defense activities upgrading of existing conference/briefing facilities is necessary for the increased interface with visiting personnel.

N Area Disposal Basin .... $ 550

At N Reactor, nonradioactive waste water is discharged into two settling ponds which empty into a common percolation pond to avoid discharging directly to the river. In recent years, the percolation pond and now the settling ponds as well have

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

required frequent dredging to keep the flooding from damaging the railroad bed, 151-N substation and underground electrical cables, and trailer septic tanks. Funding of this project will provide a solution to the problem of flooding of the nonradioactive waste water sump at N Area. One alternative under review would provide a pump and transport line from the present settling and percolation ponds to one of the natural basins at N Area to allow disposal of discharge filter backwash and Demineralization Plant effluent without flooding. Resolution of the flooding problem is needed to allow operation of the Water Treatment and Demineralization Plants without violating EPA standards, to avoid future erosion of the railroad bed which may delay shipment of essential materials, and to eliminate expenses associated with dredging the present ponds.

High-Lift Pump Discharge Piping Upgrade	$ 900

The piping from the discharge of the high-lift pumps to the RWSV-562 check valves and the valve materials have questionable fracture toughness properties. Current criteria for an acceptable level of Emergency Cooling System (ECS) reliability assumes that if one pipe section breaks, they all may break. This project will replace the three RWSV-562 check valves and the ECS discharge piping from the high-lift pumps to these check valves. Replacement materials will have proven low-temperature fracture toughness to withstand a minimum of 15 ft.-lb. of impact energy at -25°F. This replacement will upgrade the quality of materials to that of the remaining high-pressure ECS piping, which has been upgraded previously.

Engineering Support Facility	$ 900

This project will provide for an Engineering Support Facility to serve the Hanford N Reactor. The facility will allow for closer coordination of N Reactor engineering support work by consolidating this activity into one structure close to reactor operations. The major benefits gained from the facility include: improved personnel productivity, reduced energy consumption, and elimination of substandard facilities.

N Reactor Development Facility	$ 920

Funding for this project will provide for the design and construction of a development facility to serve the Hanford N Reactor. The facility will be divided into two areas consisting of a mockup assembly-test area and an office area for management and engineering personnel. The mockup assembly/test area will include general laboratory and minicomputer/software development areas. Provisions will be made for movement of test equipment in and out of these areas. The Office area will contain combination laboratory/offices, support facilities (computer room, lunchroom, and duplicating area), and standard offices.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Fuels Production Storage Building .... $ 950

This project will provide for the design and construction of a new fuels production storage building to be located to the east of the 333 Building. The new storage building will be used to store in-process fuel, finished fuel, essential materials and production tooling in sufficient quantities to meet the increased fuel production program requirements. Fuel production requirements in excess of that required to support the 6% Pu-240 production program will require approximately 25,000 square feet of additional storage capacity. The existing 300 Area facilities that could possibly be used for storage will be fully utilized by relocating fuel production equipment systems to obtain required flexibility within the 333 Building.

Oak Ridge .... $ 1,180

Miscellaneous Items - Plantwide .... $ 580
a. Sprinkler system expansion
b. Replace lime sludge beds
c. Replace overhead sump lines to General Sump
d. Replace underground water lines
e. Replace 440V underground power lines
f. Structural improvements
g. Building repairs

In Vivo Monitor, Feed Materials Production Center (FMPC) .... $ 500

Reliable lung burden measurements can only be obtained by monitoring results for FMPC workers who have been away from exposures for periods of several days or longer. This is not always possible because the mobile counter now used is not on site long enough. A permanent monitor is required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Improvements to the FMPC Fire Protection Systems .... $ 100

Several evaluations of the FMPC fire protection systems indicate deficiencies which must be corrected if adequate protection of facilities is to be obtained. In particular, extension of the sprinkler systems into presently unprotected areas is required.

Idaho .... $ 3,200

Idaho Fuels Processing Facility (IFPF) First Cycle Extraction System Decanters .... $ 200

A remote possibility exists of flooding the solvent extraction scrub column in H-Cell with aqueous solution. Should flooding occur, solution containing U-235 in the organic phase would flow into a vessel which is not critically safe. If the concentration of U-235 in organic phase became too high a criticality would occur. This project will install a vessel which is critically safe by geometry to collect the U-235 solution, allow the aqueous and organic phases to separate, and decant the phases back into the system.

IFPF Intercycle Product Storage Vessel Shielding .... $ 150

The intercycle product storage vessels for determining uranium content in the first cycle solvent extraction product will be located in M-Cell. The ceiling of M-Cell, consisting mainly of one large hatch, is only six inches thick. Radiation levels in the process make-up (PM) area above M-Cell caused by solutions in these vessels will be 5-8 mR per hour. A remote possibility exists of a postulated criticality in M-Cell which would raise radiation levels to 2000 R per hour.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

This project will install a new shielding hatch to M-Cell. The new hatch will reduce radiation levels in the PM Area to 0.125 mR per hour under normal conditions and to 25 R per hour under criticality conditions. This will allow for unrestricted, efficient operations in the PM Area and will reduce the chances of inadvertent personnel radiation exposure.

Emission Spectroscopy Cave Replacement .... $ 750

The existing emission spectroscopy cave is the only facility at the INEL for performing emission spectrographic analysis. This analysis involves vaporizing a portion of the radioactive sample with an electric arc. Emission spectrographic analysis is used to analyze highly radioactive samples (usually solids) from all plant processes (fuel dissolution, solvent extraction and waste processing). It will also be used for analysis of centrifuge solids from the Fluorinel Dissolution Process (FAST) when it becomes operational. The cave was designed in the 1960's and performed adequately for many years. However, design limitations will adversely impact its ability to meet the following current and future IFPF objectives: (a) As designed, the cave is classified as a Type II workplace (equivalent to a hood). Analyzing alpha-containing samples from the electrolytic dissolver and FAST require a Type III workplace (equivalent to a glovebox), so the existing cave is inadequate. (b) The manipulators in the existing cave are not suited for preparing sample electrodes. Furthermore, they cannot reach all areas of the cave and consequently cleanup and decontamination must be performed by direct personnel contact causing undue personnel radiation exposure and contamination. (c) The existing cave exhaust system has HEPA filters located outside the shielded area. Filter change-out is by direct "hands on" procedures, again causing undue radiation exposure and contamination.

This project will replace the existing cave with a new shielded cave designed for analyzing samples containing alpha materials. The new cave will have remote manipulators with adequate range and designed for electrode preparation. HEPA filters will be located inside the shielded cave where they can be changed remotely. This project will allow all samples to be analyzed efficiently and safely.

Analytical Laboratory Renovation ....$ 900

The analytical Laboratory Building is used for various analytical activities including: uranium analysis for accountability, analysis of service waste water going to the injection well, chemical analysis of process makeup solutions, product uranium metal composition analysis, analysis of waste streams evolving from fuel dissolution activities and analysis of gadolinium (nuclear) poison. This building is one of the oldest buildings in the IFPF complex having been built in the early 1950's. Many of the hoods

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

and lab benches are original equipment. Over the past several years, there have been recurring problems with water faucets for which parts are no longer available, gas leaks from old propane valves, and hood drains to the process equipment waste tanks leaking and spreading contamination. Several of the old hoods were fabricated with transite (compressed asbestos) walls which are somewhat porous. These transite walls have unacceptable levels of alpha and beta/gamma radioactivity absorbed in them. The flooring in the labs is square tiles which are difficult to clean up especially after contaminated liquid leaks. All of these conditions affect the reliability and accuracy of the analysis work.

This project will replace the chemical fume hoods and benches with new modern facilities. Faucets, valves and drains will be replaced. The laboratory flooring will be replaced with seamless acid-resistant flooring. This will improve the reliability and accuracy of analytical activities. It will also eliminate contamination difficulties and improve housekeeping activities.

Process Laboratory Modifications .... $ 250

The Process Laboratory requires modifications for final product analysis, very low level radioactive sample analysis, and radioactively cold sample analysis.

Retention of the Process Laboratory will require installation of a new glovebox and interconnecting hood. The ventilation system will be modified to provide required air flows. The interconnection with the existing Remote Analytical Facility will be closed up and sealed off. An "airlock-type" entrance will be provided to eliminate sudden airflow changes for contamination control.

Unirradiated Light Water Breeder Reactor (LWBR) Fuel Storage Vaults .... $ 950

IFPF has been designated as the storage site for excess unirradiated LWBR fuel rods currently stored at Bettis Atomic Power Laboratory. These fuel rods are classified as nonprocessable at IFPF; therefore, retrievable storage must be provided. The storage facilities must provide for security and surveillance requirements.

This project will construct underground fuel storage vaults. The vaults will be lined with stainless steel. A lifting fixture will be provided for retrieving the fuel rods. Geometry controls will be used to ensure criticality safety. Motion detectors and contact alarms will be provided for security and intrusion detection.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 84-D-125

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Albuquerque (LANL) $1,000

SIS Plutonium Laboratory $1,000

This project will provide for construction of a plutonium research and development laboratory for the Special Isotopes Separation (SIS) Program in Room 201 of the TA-55 building at Los Alamos National Laboratory (LANL).

San Francisco (LLNL) $1,500

Floor Reinforcment in Plutonium Building .... $ 500

This project will provide for reinforcement of the floor in the Lawrence Livermore National Laboratory (LLNL) Plutonium Building in support of the SIS program.

Laser Beam Tube Control Facility $1,000

This project will provide for construction of a building at LLNL in support of the SIS program. The building will house an alignment system, mirror controls and diagnostics for the laser beam tube connecting the laser generating facility and Plutonium Building.

10. Details of Cost Estimate

It is not possible to provide a detailed cost estimate for this project. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Plant engineering and design, various locations

2. Project No. 84-D-126

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: N/A

4. Date construction ends: N/A

5. Previous Cost Estimate: None

6. Current Cost Estimate: $2,000
Date: 12/82

7. Financial Schedule:

Fiscal Year	Obligations	Costs
1984	$2,000	$1,000
1985	0	1,000

8. Brief Physical Description of Project

This project provides for Architect-Engineering (A-E) services (Title I and Title II) on Nuclear Materials Production program construction projects which the agency has under consideration for authorization request in future years. This will allow certain designated projects to proceed from conceptual design into preliminary design (Title I) and definitive design (Title II) prior to formal Congressional authorization. The design effort accomplished under this project will be sufficient to assure project feasibility, define the scope, provide detailed estimates of the cost of construction based on the approved design and working drawings and specifications, and provide construction schedules including procurements. The design effort will generally be extensive enough so that construction can physically start or contracts be let for long lead procurement items in the budget fiscal year in which Congressional authorization is received.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Plant engineering and design, various locations

2. Project No. 84-D-126

9. Purpose, Justification of Need for, and Scope of Project

Conceptual studies completed for a project, utilizing operating funds, define the scope of the project and produce a rough cost estimate and schedule. These conceptual design studies are completed 9-12 months before the budget is submitted to Congress, meaning that the studies are as much as 24 months old by the time authorizing legislation is enacted. The use of these project funds to proceed immediately upon completion of conceptual design into A-E designs (Title I and II) would permit acceleration of new production facilities, provide savings in construction costs based on current rates of inflation and would permit much more reliable cost estimates being available to Congress when the budget is presented. Projects currently intended to be undertaken with FY 1984 PE&D funds are described below. Some changes may occur as a result of continuing conceptual design studies or developments prior to authorization and appropriation.

PUREX Facility Improvements, Richland, Washington $1,000

This project will provide for upgrading of processing vessel structure supports and systems within the PUREX plant to improve the long-term safety and reliability of facility operations. Areas of consideration include improvements to the floors and walls inside canyon cells and the hot pipe trench, improvement of remote maintenance handling, replacement of inaccessible piping, and upgrades of electrical instrumentation and control systems.

Production Facilities Restoration, Savannah River, South Carolina $1,000

This project will provide advance design on those restoration projects which will benefit by reduced schedules such as the canyon vessel repair facility and JB line supporting services.

10. Details of Cost Estimate

	Estimated Total Cost
a. Engineering design	$ 2,000
b. Construction costs	0
Total Project Cost	$ 2,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Modification Processing Facility Substations, Savannah River, South Carolina

2. Project No. 84-D-130

3. Date A-E Work Initiated: 2nd Qtr. FY 1983[1]

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 2nd Qtr. FY 1985

5. Previous Cost Estimate: None

6. Current Cost Estimate: $ 7,000
Less PE&D (FY 83): 400
Net Cost Estimate: $ 6,600
Date: 11/82

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 5,600	$ 5,600	$ 5,600	$ 3,000
1985	1,000	1,000	1,000	3,600

8. Brief Physical Description of Project

This project upgrades the 251-F and H Area electrical substations and distribution systems that supply electricity for plutonium processing. The capacity of 251-F and 251-H substations will be increased to meet projected electrical demands resulting from expansion of production facilities in each area. This includes installation of replacement transformers of large capacity, enlarging electrical switchgear, and upgrading area process electrical feeders. The new system will utilize as many existing components as possible, including the substation control buildings.

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[1] PE&D funded design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Modification Processing Facility Substations, Savannah River, South Carolina

2. Project No. 84-D-130

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9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to assure operational continuity of all production operations within the two separations areas by installing redundant electrical service of sufficient size to support increased production requirements within 200-F and 200-H areas. In order to avoid unplanned processing interruptions, the substations must be of sufficient capacity such that a single transformer can supply the total area requirements. The existing F Area and H Area substations contain two 9.4 MVA transformers in parallel. Currently during peak periods, the electrical demands (12 MVA in F Area and 12.5 MVA in H Area) exceed the rated capacity of a single transformer (9.4 MVA). Funding is required in FY 1984 to assure completion of facilities before FY 1985 when the forecasted area load growth associated with ongoing and planned projects exceeds current full substation capacity, (18.8 MVA). FY 1984 funding will ensure that one new transformer will be operational in each area by fourth quarter FY 1984. Without system upgrading the following situations will occur:

- Area operational continuity would be jeopardized by routine events such as electrical system maintenance work. This situation occurs routinely twice each year in each separation area.

- Program interruptions in excess of 6 months would be necessary to maintain area loads within the limits of the supply capability should failure occur in one of the existing transformers or associated switchgear.

- New programs and/or facilities planned after FY 1985, which place additional electrical demands on the areas, will exceed substation capacity.

Upgrading of the 251-F and 251-H electrical supply systems will return the redundancy of feed characteristic to the electrical supply system in 200-F and 200-H areas for existing and anticipated future loads.

The funds requested in FY 1984 will be used for final design, procurement of equipment and partial installation. The FY 1985 funds will be used to complete construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Modification Processing Facility Substations, Savannah River, South Carolina

2. Project No. 84-D-130

10. Details of Cost Estimate:[2]

Item	Total Cost
a. Engineering design and inspection at approximately 17% of construction costs, Item b	$ 835 [3]
b. Construction costs	4,900
c. Removal costs	215
Subtotal (Items a, b, and c)	5,950
d. Contingencies at approximately 18% of above costs	1,050
Total estimated cost	$7,000

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[2] Based on approximately 70% completion conceptual design.

[3] Includes PE&D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Modification Processing Facility Substations, Savannah River, South Carolina

2. Project No. 84-D-130

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontract awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

A. Total Project Funding	Prior Years	FY 1984	FY 1985	Total
1. Total Facility Costs				
a. Construction Line Item	$ 0	$3,000	$3,600	$6,600
b. PE&D	400	0	0	400
c. Expense Funded Equipment	0	0	0	0
d. Inventories	0	0	0	0
Total Facility Costs	400	3,000	3,600	7,000
2. Other Project Funding				
a. R&D	145	0	0	145
b. Other Project Related Cost	2,650	0	0	2,650
Total Other Project Funding	2,795	0	0	2,795
Total Project Funding	$3,195	$3,000	$3,600	$9,795

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Modification Processing Facility Substations, Savannah River, South Carolina

2. Project No. 84-D-130

12. Funding Schedule of Project Funding and Other Related Funding Requirements (Continued)

	Annual Cost
B. Total Related Funding Requirements (estimated life of project is 20 years)	
1. Facility Operating Costs	$ 0
2. Programmatic Operating Expense Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4. GPP or Other Construction Related to the Programmatic Effort in the Facility	0
5. Other Costs	0
Total Related Annual Funding Requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Funding Requirements:

- A. Total Project Funding
  - 1. Total Facility
    - a. Construction Line Item - no narrative required.
    - b. PE&D - $400,000 in FY 1983.
    - c. Expense Funded Equipment - none.
    - d. Inventories - none.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: PUREX Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

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3. Date A-E Work Initiated: 3rd Qtr. FY 1982

3a. Date Physical Construction Starts: 1st Qtr. FY 1983

4. Date Construction Ends: 4th Qtr. FY 1986

5. Previous Cost Estimate: $13,000
Date: 2/82

6. Current Cost Estimate: $13,000
Less PE&D (FY 82): 250
Net Cost Estimate: $12,750
Date: 4/82

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7. Financial Schedule of Project Funding

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1983	$ 4,250 [a]	$ 4,250	$ 4,250	$ 850
1984	8,500	8,500	8,500	4,000
1985	0	0	0	5,900
1986	0	0	0	2,000

8. Brief Physical Description of Project

This project will improve the existing PUREX ventilation system by providing (1) a high efficiency particulate air (HEPA) filter facility for canyon exhaust and rerouting of existing filtered and washed air into the canyon; and (2) addition of redundant fans and two-stages of HEPA filtration to auxiliary exhaust system with building improvements to reduce air in-leakage and dust loading on existing pre-filters.

The PUREX canyon exhaust HEPA filter system will contain two stages of filtration and be housed in a new building located adjacent to existing PUREX canyon filters. The system will be constructed to permit maintenance, filter replacement, and testing as necessary. The system building will be located within the protected area security fence with necessary access to service roads and walkways to accommodate vehicular and personnel traffic.

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[a] Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

8. Brief Physical Description of Project (cont'd)

The two existing Deep Bed Fiberglass Filters (DBFF), identified as Filters No. 1 and No. 2, will be operated as pre-filters and the existing HEPA filter, identified as Filter No. 3, will be used as a backup pre-filter in the event of a failure of either Filter No. 1 or No. 2.

The ventilation systems supplying air to the PUREX building will be rerouted and modified, where feasible, to improve particulate filtration and minimize in-leakage. Existing auxiliary ventilation equipment will be modified, replaced, or supplemented to reduce supply air treatment with subsequent reduction in energy consumption. Redundant fans, additional HEPA filters and monitoring upgrades will be provided for auxiliary exhaust system to improve the system reliability.

9. Purpose, Justification of Need for, and Scope of Project

The first DBFF built for the PUREX canyon was installed in 1955. The second DBFF was installed in mid-1960 as back-up to the first filter. Both filters are operated in parallel for adequate air flow. These two filters are roughly equivalent to one stage of HEPA filtration and have a limited service life remaining. Current filtration criteria recommends two stages of HEPA filtration for environmental control of radioactive particulate emissions.

Filter No. 3 does not meet current standards for testing, maintainability, or changeability and has a relatively short expected service life. This filter uses HEPA filters that are not washable or replaceable, and they have a greater tendency for plugging than Filters No. 1 and No. 2. These factors contribute to the limited useful life of Filter No. 3 which is being held in reserve. If in the future it becomes apparent that No. 1 or No. 2 filters will reach the end of their useful life, the No. 3 filter will be placed into service. The proposed HEPA filtration system is required to permit the PUREX Canyon exhaust to meet applicable criteria for particulate emissions, at the point of discharge, as specified in DOE Order 5820.2. Current criteria, including ANSI N-510, DOE Order 6430 and Hanford Plant Standards, require good airflow distribution and proper access to accommodate testing, monitoring, and replacement of particulate filters. This project will be designed in compliance with these standards and will allow rapid switching of air flow to accommodate filter replacement without shutting down the PUREX Plant. Because of space limitations near the PUREX exhaust stack, the continued addition of short term filter facilities, such as Filter No. 3, will not be possible. Therefore, the new filter system must include filter replacement capability to assure continued use of the filter system for the planned operating life of the PUREX Plant.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The proposed improvements to the supply air systems, including extensive system modifications and improved filtration, are required to reduce in-leakage to the PUREX building and for the rerouting of washed and filtered air into the canyon. This will reduce dust loading on the existing pre-filters No. 1 and No. 2, thus extending their useful life. The new filter facility will function as a last stage filter for PUREX and permit the safe washing of pre-filters without risk of discharging dislodged particulates to the environment. The improvements will also reduce energy consumption with utilization of existing treated auxiliary air supply systems that will be rerouted to the canyon. It is essential that the exhaust air tunnel transition section be constructed prior to the date PUREX resumes operation. If constructed after PUREX resumes operations, the PUREX Plant would have to be shutdown impacting plutonium processing activities. Construction cost would also increase significantly due to increased radiation levels.

FY 1984 funding will provide for continuation of design, equipment procurement and installation, and construction to meet FY 1986 construction completion without adversely affecting PUREX operation.

10. Details of Cost Estimates[a]	Item Cost	Total Cost
A. Engineering, design and inspection at approximately 15 percent of construction (Item B)		$ 1,340[b]
B. Construction costs		$ 8,940
1. Improvements to land including grading, landscaping, drainage, diversion, paving, parking, fencing, lighting, and pedestrian access walks	$ 450	
2. Building - includes doors and windows, insulation, concrete, finishes conveying system, etc.	4,290	
3. Utilities - Electrical power, steam line relocation, air and water service	300	
4. Special Equipment - HEPA filters, filter modules, fans, monitors, dampers, valves, etc.	3,900	
Subtotal		$10,280
C. Contingency at approximately 25 percent of above costs		2,470
Total project cost		$12,750

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[a] Based on Conceptual Design Estimate.
[b] Excludes $250 thousand of PE&D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

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11. Method of Performance

Design and inspection will be performed by the onsite architect-engineer (A-E). Construction will be performed by the onsite construction services contractors using fixed price subcontractors where feasible. Ventilation balancing will be performed by the operating contractor.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
A. Total Project Funding						
1. Total Facility Costs						
(a) Construction Line Item	$ 0	$ 850	$ 4,000	$ 5,900	$ 2,000	$12,750
(b) PE&D	250	0	0	0	0	250
(c) Expense Funded Equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	250	850	4,000	5,900	2,000	13,000
2. Other Project Funding						
(a) R&D Necessary to Complete Construction	200	0	0	0	0	200
(b) Other Project Related Cost	50	150	150	150	200	700
Total Other Project Funding	250	150	150	150	200	900
Total Project Funding (Item 1 and Item 2)	$ 500	$ 1,000	$ 4,150	$ 6,050	$ 2,200	$13,900

B. Total Related Funding Requirements (Estimated life of project - 25 years)

(1) Facility Operating Costs	$ 300 a/
(2) Programmatic Operating Expenses Directly Related to the Facility	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 300

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a/ This facility is an addition to the Richland PUREX plant which has an operating budget of about $40,000,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Filter System Improvements, Richland, Washington

2. Project No: 83-D-138

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
   1. Total Facility
      (a) Construction Line Item - no narrative required
      (b) PE&D - PE&D funding will provide for A-E services to proceed from conceptual design into preliminary design (Title I)
      (c) Expense Funded Equipment - not applicable.
      (d) Inventories - not applicable.
   2. Other Project Funding
      (a) R&D Necessary to Complete - the estimated conceptual design effort for this project is $200,000.
      (b) Other Project Related Funding - These costs are associated with project support and management, design review and security forces and radiation monitoring activities.

B. Other Related Funding Requirements

These facilities have an estimated life of 25 years.

1. Facility Operating Costs - after installation, there will be minor operating costs involving maintenance and repair activities.
2. Programmatic Operating Expenses Directly Related to the Facility - this facility is an addition to the chemical processing facilities (PUREX plant) which has an annual operating budget of approximately $40,000,000.
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility - not applicable.
4. GPP or Other Construction Related to Programmatic Effort - not applicable.
5. Other Costs - not applicable.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System,
Idaho Fuels Processing Facility,
Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

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3. Date A-E Work Initiated: 2nd Qtr. FY 1982 (PE&D Funds)

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate: $8,000
Date: 12/81

6. Current cost estimate: $8,000
Less amount for PE&D
(FY 1982): 400
Net cost estimate: $7,600
Date: 12/82

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$3,500 a/	$3,500	$3,500	$ 700
1984	4,100	4,100	4,100	3,500
1985	0	0	0	2,700
1986	0	0	0	700

8. Brief Physical Description of Project

This project provides for equipment additions, equipment replacements, and system modifications to the existing krypton-85 recovery system at the Idaho Fuels Processing Facility (IFPF). An off-gas line will be installed from the new Fluorinel process to the existing Rare Gas Plant. Diversion valves and instrumentation will be installed in the Fluorinel system and a hydrogen removal system will be added to reduce the hazardous nature of the Fluorinel off-gas. Additional gas treatment systems will be added to remove other unacceptable constituents such as iodine and nitrogen oxides prior to feed to the existing recovery system.

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a/ Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

9. Purpose, Justification of Need for, and Scope of Project

Krypton-85 has several industrial applications including use for quality control testing by the defense related electronics industry. It is required for the leak testing of transistors, flow lines and radioactive sources as well as thickness gauges for manufacturing operations.

A recent supply/demand analysis indicates that a serious supply situation is being encountered regarding firm requirements for krypton-85 in the early 1980's and a significant shortfall is expected to continue until the completion of this project. The analysis indicates that sufficient material may not meet requirements for both industry applications and Department of Defense (DOD) development programs, much less the agency's civilian waste management research and development requirements.

The only present source of radioactive krypton-85 in the free world is the Rare Gas Plant at the IFPF. The krypton currently recovered is from aluminum-clad reactor fuels processed from the dissolver off-gas of the existing headend processing facility. However, after 1985 little fuel will be processed in the existing headend due to the significantly increased load of fuel scheduled for Fluorinel processing. Thus, an off-gas line connecting the Fluorinel Process system to the Rare Gas Plant is required to maintain krypton availability.

In the past the Rare Gas Plant has operated under a recovery efficiency of approximately 40 percent. However, with the off-gas line connection to the Fluorinel process in conjunction with a hydrogen removal system, included in the scope of this project, the efficiency of the plant is expected to increase significantly. This level will establish a long-term source of this urgently needed byproduct and meet the projected industrial and defense-related requirements.

The alternatives to this project are to halt recovery of krypton-85 or to construct a new recovery plant at another DOE facility. The first alternative would create a serious shortfall of krypton-85 by the mid-1980's. The U.S. would have no long-term supply of krypton-85, thus defense applications would become increasingly dependent upon materials supplied by foreign nations and certain national security interests may be affected. Studies indicate the second alternative is neither cost effective nor timely to support the demand. A recent analysis indicates that the cost of this project will be fully amortized by the price of krypton-85.

The budget authority level requested in FY 1984 is for continuation of facility procurement and construction activities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System,
Idaho Fuels Processing Facility,
Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

10. Details of Cost Estimate [a]

	Item Cost	Total Cost
a. Engineering, Design and Inspection Costs at 39% of construction costs, item b[b]		$ 1,800[c]
b. Construction Costs		4,600
(1) Equipment	$ 1,400	
(2) Special Facilities	2,800	
(3) Utilities	400	
Subtotal		6,400
c. Contingency at 25% of above costs		1,600
Total		$ 8,000[c]

11. Method of Performance:

Design, construction, and procurement will be accomplished by prime contracts and/or subcontracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

A. Total Project Funding	Prior Years	FY 1984	FY 1985	FY 1986	Total
1. Total Facility Cost					
a. Construction Line Item	$ 700	$ 3,500	$ 2,700	$ 700	$ 7,600
b. PE&D	400	0	0	0	400
c. Expense Funded Equipment	0	0	0	0	0
d. Inventories	0	0	0	0	0
Total Facility Costs	$ 1,100	$ 3,500	$ 2,700	$ 700	$ 8,000

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[a] The above estimates are based on conceptual design and feasibility studies which are complete and partial completion of Title I (preliminary) design.

[b] Based on two complete design packages for work at the FAST project (77-13-a) and at the Rare Gas Plant, extensive health-physics support for work in a contaminated area.

[c] Includes $400,000 in PE&D funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (cont'd)

	Prior Years	FY 1984	FY 1985	FY 1986	Total
2. Other Project Funding					
a. R&D necessary to complete construction	$ 190	$ 0	$ 0	$ 0	$ 190
b. Other project related costs	296	240	350	100	986
Total Other Project Funding	486	240	350	100	1,176
Total Project Funding	$ 1,586	$ 3,740	$ 3,050	$ 800	$ 9,176

B. Total Related Funding Requirement (Estimated Life of Facility: 25 years)

1. Facility Operating Costs	$ 100
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	10
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$ 110

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding

1. Total Facility

a. Construction Line Item - no narrative required.
b. PE&D - $400,000 was provided in FY 1982.
c. Expense Funded Equipment - no narrative required.
d. Inventories - no narrative required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System,
Idaho Fuels Processing Facility,
Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (cont'd)

2. Other Project Funding

a. R&D Necessary to Complete Construction: Approximately $190,000 has been spent for conceptual design.

b. Other Project Related Funding: Approximately $986,000 will be spent for project support during design and construction, and for testing and startup of the completed facility.

B. Total Related Funding Requirements - Facility operating costs amount to $100,000 annually for maintenance of facility equipment, $10,000 of annual capital equipment costs is for instrumentation replacement.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Water pollution control, Feed Materials Production Center, Fernald, Ohio

2. Project No: 83-D-146

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3. Date A-E work initiated: 2nd Qtr. FY 1982 (PE&D)

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $ 9,700
Less amount for PE&D: 200
Net cost estimate: $ 9,500
Date: 2/82

6. Current cost estimate: $ 9,700
Less amount for PE&D: 200
Net cost estimate: $ 9,500
Date: 12/82

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$1,400 a/	$1,400	$1,400	$ 710
1984	4,000	4,000	4,000	1,864
1985	4,100	4,100	4,100	5,448
1986	0	0	0	1,478

a/ Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

8. Brief physical description of project

This project will provide facilities at the Feed Materials Production Center (FMPC) at Fernald, Ohio, to achieve compliance by July 1, 1986, with the objectives established in the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977 for "Best Available Technology Economically Achievable" (BATEA).

The pollutants of primary concern are nitrates, ammonia, chlorides, suspended solids, and the pH of the coal pile drainage. The project includes the following:

`CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Water pollution control, Feed Materials Production Center, Fernald, Ohio

2. Project No: 83-D-146

8. Brief physical description of project (cont'd)

A facility to treat the effluent stream from the General Sump and the Clearwell. This stream is made up of neutralized effluents from all Process Plants, Water Treatment Plant, and the Boiler Plant blowdown. The facility will consist of a denitrification system, a holding lagoon, transfer pumps, piping, and pumping station buildings to accommodate a biological degradation of nitrate and ammonia ions.

A facility to impound and settle all rainwater falling within the production area of FMPC. The facility will consist of a lagoon to hold for recycle to the General Sump any inadvertent chemical spill within the production area, a settling basin for rainwater retention and suspended solids reduction, and necessary pumping station to transfer the settling basin effluent to the sewage plant for final disposition.

A facility at the Boiler Plant-Water Plant complex for the collection and primary treatment of acidic water drainage from the Boiler Plant coal pile. A collection trench system, sump, neutralization bed, and pumps for transferring the effluent to the General Sump will be provided.

An alternate disinfection system to replace the existing chlorination system, thus reducing the chlorine residuals from the sewage treatment plant effluent.

FY 1984 project funds will be used to initiate construction and asociated Title III engineering efforts.

9. Purpose, justification of need for, and scope of project

Facilities proposed in this project are required to comply with the Federal Water Pollution Control Act as amended by the Clean Water Act and Federal and State Water Quality Standard Requirements for Surface Streams, and to make corrections towards complying with the Toxic Substances Control Act. The present National Pollutant Discharge Elimination System (NPDES) permit under which the FMPC is operating was issued in November 1980, and will continue in effect until July 1984, when BATEA effluent limitations will be imposed. The facilities and systems required for treatment of effluents for the BATEA limitations do not currently exist at the FMPC and must be provided.

Alternatives

There are no practicable alternatives to this project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Water pollution control, Feed Materials Production Center, Fernald, Ohio   2. Project No: 83-D-146

10. Details of Cost Estimate[a]	Item Cost	Total Cost
a. Engineering, design and inspection costs for partial Titles I and II and total Title III		$ 1,520 [b]
b. Construction Costs		6,600
(1) Improvements to land	$1,700	
(2) Buildings	150	
(3) Other Structures	150	
(4) Special Facilities	4,600	
c. Standard Equipment	0	0
Subtotal		$8,120
d. Contingency at approximately 20% of above costs		1,580
Total Project Cost		$9,700

11. **Method of Performance**

Design and inspection will be on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. **Funding Schedule of Project Funding and Other Related Funding Requirements**

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
A. Total Project Funding						
(1) Total Facility Costs						
(a) Construction line item	$ 0	$ 710	$1,864	$5,448	$1,478	$9,500
(b) PE&D	200	0	0	0	0	200
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	200	710	1,864	5,448	1,478	9,700

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[a] Based on completed conceptual design and PE&D efforts.
[b] Includes $200,000 in PE&D funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Water pollution control, Feed Materials Production Center, Fernald, Ohio   2. Project No: 83-D-146

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
(2) Other Project Funding						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Other project related costs	60	0	0	0	0	60
Total Other Project Funding	60	0	0	0	0	60
Total Project Funding	$ 260	$ 710	$1,864	$5,448	$1,478	$9,760

B. Total related annual funding requirements	
(1) Facility operating costs	$ 782
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to the programmatic effort in the facility	0
(5) Other Costs	0
Total other related annual funding requirements	$ 782

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
   (1) Total Facility
      (a) Construction line item funding - no narrative required.
      (b) PE&D - FY 1981.
      (c) Expense funded equipment - none.
      (d) Inventories - none.
   (2) Other Project Funding
      (a) R&D necessary to complete - none.
      (b) Other project related costs - conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Water pollution control, Feed Materials Production Center, Fernald, Ohio

2. Project No: 83-D-146

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

B. Total Related Funding Requirements
  (1) Facility operating costs - Includes $34,000 for maintenance, $33,000 for operating personnel, and $715,000 for chemicals; all in FY 1984 dollars.
  (2) Programmatic operating expenses - none.
  (3) Capital equipment - none.
  (4) GPP or other construction - none.
  (5) Other costs - none.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

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3. Date A-E Work Initiated: 2nd Qtr. FY 1983

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 2nd Qtr. FY 1987

5. Previous Cost Estimate: $ 9,350
Date: 12/81

6. Current Cost Estimate: $10,000
Less PE & D 350
Net Cost Estimate: $ 9,650
Date: 12/82

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 1,000 [a]	$ 1,000	$ 1,000	$ 200
1984	2,000	2,000	2,000	1,800
1985	6,650	6,650	6,650	5,000
1986	0	0	0	2,250
1987	0	0	0	400

8. Brief Physical Description of Project

This project provides facilities to control suspended solids and undesirable chemicals in aqueous effluents from Savannah River's (SR's) major powerplants. Some effluents, such as those containing chlorine or chromium from water treatment operations, will be treated chemically to control pH and chemical content prior to release. Other effluents, such as powerhouse wash down water containing ash and coal dust in suspension, will be redirected to retention basins to control suspended solids. Shutdown of production facilities will not be required for installation of the control features.

Purpose, Justification of Need for, and Scope of Project

The facilities this project provides are necessary to control liquid effluents within the requirements of the National Pollutant Discharge Elimination System (NPDES) permit SC0000175 issued under the Federal Water Pollution Control Act of 1972 in accordance with Executive Order 12088, Incorporation of Measures for Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities.

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[a] Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The mandates of the Clean Water Act require the control of point sources of pollution reaching surface waters. Compliance with these mandates is aggressively enforced by the State of South Carolina, which has authority over SR's NPDES Permit. This permit has had a Notice of Violation in effect since July 1977 that has never been rescinded. The State has shown by past experience that it will not hesitate to penalize Federal facilities for being recalcitrant. FY 1984 funds will be used to complete design and initiate construction.

10. Details of Cost Estimate[a]

		Item Cost	Total Cost
A. Engineering design and inspection at 21 percent of construction costs, Item B			$ 1,375[b]
B. Construction costs			6,665
(1) Improvements to land		$ 10	
(2) Buildings at approximately $167 per sq. ft.		45	
(3) Special facilities		6,610	
(a) Equipment	$ 1,330		
(b) Piping	3,422		
(c) Instrumentation	670		
(d) Electrical	1,188		
C. Removal costs			0
Subtotal			8,040
D. Contingency at approximately 26% of above costs			1,960
Total Estimated Cost			$10,000

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

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[a] Based on complete conceptual design.

[b] Includes $350,000 PE & D

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total Project Funding							
1) Total Facility Costs							
a) Construction Line Item	$ 0	$ 200	$ 1,800	$ 5,000	$2,250	$ 400	$ 9,650
b) PE&D	350	0	0	0	0	0	350
c) Expense Funded Equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 350	$ 200	$ 1,800	$ 5,000	$2,250	$ 400	$10,000
2) Other Project Funding							
a) R&D Necessary to Complete Construction	$ 200	$ 0	$ 0	$ 0	$ 0	$ 0	$ 200
b) Other Project Related Costs	0	0	0	0	0	0	0
Total Other Project Funding	200	0	0	0	0	0	200
Total Project Funding	$ 550	$ 200	$ 1,800	$ 5,000	$ 2,250	$ 400	$10,200

b. Total Related Funding Requirements (Estimated life of project: 20 years)

1) Facility Operating Costs	$ 0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding
   1) Total Facility Costs
      a) Construction Line Item - No narrative required.
      b) PE&D - FY 1982.
      c) Expense Funded Equipment - None.
      d) Inventories - None.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina	2. Project No: 83-D-147

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

2) Other Project Funding
    a) R&D Necessary to Complete Construction - Conceptual design and engineering studies.
    b) Other Project Related Costs - None.

b. Total Related Funding Requirements
    1) Facility Operating Costs - None.
    2) Programmatic Operating Expenses Directly Related to the Facility - None.
    3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - None.
    4) GPP or Other Construction Related to Programmatic Effort - None.
    5) Other Costs - None.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Non-radioactive hazardous waste management, Savannah River, South Carolina

2. Project No. 83-D-148

3. Date A-E Initiated: 3rd Qtr. FY 1983

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 4th Qtr. FY 1987

5. Previous Cost Estimate: $20,400
Date: 12/81

6. Current Cost Estimate: $22,600
Less amount for PE&D: 500
Net cost estimate: $22,100
Date: 12/82

7. Financial Schedule of Construction Project Funding

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983 [a/]	$ 1,000	$ 1,000	$ 1,000	$ 200
1984	3,000	3,000	3,000	2,390
1985	18,100	18,100	18,100	13,370
1986	0	0	0	3,940
1987	0	0	0	2,200

8. Brief Physical Description of Project

This project will provide facilities to dispose of hazardous waste generated at the Savannah River Plant. The items to be provided include:

- A permanent landfill in which to bury solid hazardous wastes.
- Modifications to 400 Area boiler to incinerate hazardous volatile liquids.
- Facilities in each of the 7 major operating areas to contain chemical spills and to recover or neutralize accidental spills prior to release to the environment. Current plans are to install diked impermeable basins beneath storage tanks and at the unloading stations for rail and truck chemical carriers.
- Facilities in 300-M metallurgical manufacturing area to adjust the pH of aqueous effluents destined for disposal in seepage basins.
- Facilities in the H separations area to remove hazardous heavy metals from the aqueous effluents destined for disposal in seepage basins.

[a/] Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Non-radioactive hazardous waste management
Savannah River, South Carolina

2. Project No. 83-D-148

8. Brief Physical Description of Project (cont'd)

- Facilities in the Savannah River Laboratory Semiworks and F and H Separations areas to adjust the pH of aqueous effluents from experimental equipment and process systems prior to discharge to the seepage basins.
- Fences, utilities, and buildings as needed for the operation, safety, and security of these facilities.

FY 1984 funding will be used to continue design and initiate construction.

9. Purpose, Justification of Need for, and Scope of Project

The facilities to be provided under this project are required to treat and dispose of hazardous wastes generated at the Savannah River Plant in a manner that will meet regulations promulgated by the Federal Environmental Protection Agency (EPA) and the State of South Carolina under the Resource Conservation and Recovery Act of 1976. Recent measurements have indicated that organic waste from Savannah River's existing seepage basins have begun to enter the groundwater. This presents a potential hazard since certain of these wastes - mercury, trichlorethylene, and perchlorethylene - are toxic or suspected carcinogens. As a initial step towards rectifying such problems current waste streams will be brought into compliance with regulations. Failure to take corrective action is likely to result in legal action by the State of South Carolina and the loss of public trust.

10. Details of Cost Estimate[a]		Item Cost	Total Cost
A. Engineering, design, and inspection at approximately 20% of construction cost, Item B.....			$ 2,945[b]
B. Construction costs..........			14,810
1) Improvements to land..........		$ 40	
2) Buildings.......... Four at aproximately $75 per sq. ft.		430	
3) Special Facilities..........		14,340	
a) Equipment..........	$ 9,600		
b) Piping..........	2,805		
c) Instrumentation..........	735		
d) Electrical..........	1,200		
C. Removal costs..........			0
Subtotal			17,755
D. Contingencies at Approximately 27% of above costs..........			4,845
Total Estimated Cost..........			$ 22,600

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a/ Based on completed conceptual design.
b/ Includes PE&D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Non-radioactive hazardous waste management
Savannah River, South Carolina

2. Project No. 83-D-148

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Pending Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1985	FY 1987	Total
A. Total Project Funding							
1) Total Facility Costs							
a) Construction Line Item	$ 0	$ 200	$ 2,390	$13,370	$ 3,940	$ 2,200	$22,100
b) PE&D	500	0	0	0	0	0	500
c) Expense Funded Equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 500	$ 200	$ 2,390	$13,370	$ 3,940	$ 2,200	$22,600
2) Other Project Funding							
a) R&D Necessary to Complete Construction	$ 325	$ 0	$ 0	$ 0	$ 0	$ 0	$ 325
b) Other project related costs	0	0	0	0	0	0	0
Total Other Project Funding	325	0	0	0	0	0	325
Total Project Funding	$ 825	$ 200	$ 2,390	$13,370	$ 3,940	$ 2,200	$22,925

B. Total Other Related Funding Requirements (Estimated life of project: 20 years)

1) Facility Operating Costs	$ 0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to the Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Non-radioactive hazardous waste management
Savannah River, South Carolina

2. Project No. 83-D-148

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding
  1) Total Facility Costs
    a) Construction Line Item - No narrative required.
    b) PE&D - $500 provided in FY 1981.
    c) Expense Funded Equipment - None.
    d) Inventories - None required.

  2) Other Project Funding
    a) R&D Necessary to Complete - Conceptual design and engineering studies.
    b) Other Project Related Costs - None.

B. Total Related Funding Requirements
  1) Facility Operating Costs - None.
  2) Programmatic Operating Expenses Directly Related to the Facility - None.
  3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - None.
  4) GPP or Other Construction Related to Programmatic Effort - None.
  5) Other Costs - None.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Facility storage modifications, Various Locations

2. Project No. 83-D-180

3. Date A-E Work Initiated: 1st Qtr. FY 1983

3a. Date Physical Construction Starts: 2nd Qtr. FY 1983

4. Date Construction Ends: 2nd Qtr. FY 1985

5. Previous Cost Estimate: $16,300
Date 3/82

6. Current Cost Estimate: $15,800
Date: 12/82

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 9,300 a/	$ 9,300	$ 9,300	$ 5,380
1984	6,500	6,500	6,500	4,000
1985				6,420

8. Brief Physical Description of Project

This project provides for expanded storage facilities and associated equipment at Savannah River; and at the Oak Ridge Feed Materials Production Center (FMPC), and Reactive Metals, Inc. (RMI) Ashtabula Plant.

At Savannah River this project provides building expansion, tooling, and equipment to support three reactor operations with MK 15 fuel and 3% Pu-240 product. The project requires: expansion for storage of 11,600 square feet in one location and 11,400 square feet in a second location, addition of 25 autoclaves for fuel testing, and new tooling. (TEC $15,000,000)

At Oak Ridge this project provides for a 12,000 square foot warehouse for storage of uranium compounds, and a 4,400 square foot in-process space modification both at FMPC (TEC $800,000). The 19,000 square foot receiving storage and shipping warehouse at the RMI Ashtabula Plant (TEC $500,000) is under construction utilizing GPP funds and was removed from the scope of this project.

a/ Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Storage Modifications, Various Locations

2. Project No. 83-D-180

9. Purpose, Justification of Need for, and Scope of Project

The MK 15 is a slightly enriched fuel that can increase plutonium production in a Savannah River reactor. New fabrication facilities and equipment are required for three reasons: (1) higher enrichments, (2) changed fuel size, and (3) larger number of fuel pieces.

The two new storage buildings will provide critically safe storage for the low enriched MK 15 fuel cores and slugs. Twenty-five additional autoclaves will be needed to increase fuel production to 30,000 plus cores per month and maintain a 70 hour autoclave test. These tests are necessary to ensure that the slugs will not fail during reactor irradiation. Slug failures would cause increased radiation releases and increased reactor downtime. In addition to new tooling, additional backup tooling will be required to support an increase in fuel production rate.

The increase in billet deliveries to RL supports the conversion of N-Reactor to 6% plutonium-240 production (and possibly to 5% and higher power) and the change of the SR reactors to the slightly enriched uranium MK-15 fuel result in a need for additional storage space at the Feed Materials Production Center.

The impact of the increase in N-Reactor deliveries is approximately linearly related to the rate change, but the space at Ashtabula is less than that required for the N-Reactor deliveries scheduled for FY 1984 and beyond.

The impact of the change to the MK-15 is much more significant. The current fuel, MK-31, is composed of depleted uranium and in-process storage can be at a much higher uranium density than is the case with enriched uranium metal. Also, the change to a total enriched uranium load puts the FMPC into a total recycle (chemical recycle) mode. This greatly increases the space required for in-process storage of the various enriched uranium compounds (salvage awaiting recycle, UO_2, UO_3, UF_4, etc.).

FY 1984 funds will be used to complete project construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Storage Modifications, Various Locations	2. Project No. 83-D-180

10. Details of Cost Estimate[a]

Item	($ in thousands) Item Cost	($ in thousands) Total Cost
A. Engineering Design and Inspection at approximately 15% of Construction Costs, Item b.		$ 1,660
B. Construction Costs		10,790
1. Buildings	$5,600	
2. Special Facilities	4,300	
3. Utilities	890	
C. Removal Costs less Salvage		500
Subtotal		12,950
D. Contingency at approximately 22% of above cost		2,850
Total		$15,800

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
A. Total Project Funding					
1. Total Facility Costs					
a) Construction Line Item	$ 0	$5,380	$4,000	$6,420	$15,800
b) PE&D	0	0	0	0	0
c) Expense Funded Equipment	0	0	0	0	0
d) Inventories	0	0	0	0	0
Total Facility Costs	$ 0	$5,380	4,000	$6,420	$15,800

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[a] Based on conceptual design which is 90% complete.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Storage Modifications, Various Locations — 2. Project No. 83-D-180

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

	Prior Years	FY 1983	FY 1984	FY 1985	Total
A. Total Project Funding					
2. Other Project Funding					
a) R&D	$ 350	$ 50	$ 0	$ 0	$ 400
b) Other projected related costs	60	100	50	10	220
Total Other Project Funding	410	150	50	10	620
Total Project Funding	$ 410	$5,530	$4,050	$6,430	$16,420

B. Total Related Funding Requirements (Estimated Life of Project: 20 years)

1. Facility Operating Costs	$ 0
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	1,025
4. GPP or Other Construction Related to Programmatic Effort in the Facility	100
5. Other Costs	0
Total Other Related Annual Funding Requirements	$1,125

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
1. Total Facility Costs
   a. Construction Line Item - No narrative required.
   b. PE&D - No PE&D funding is required.
   c. Expense Funded Equipment - No expense funded equipment is required.
   d. Inventories - No inventories are needed for the proposed facilities.
2. Other Project Funding
   a. R&D - Conceptual design and engineering studies.
   b. Other Project Related Costs - Preparation of procedures, training of personnel, and plant liaison.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Storage Modifications, Various Locations

2. Project No. 83-D-180

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

B. Total Related Funding Requirements (Estimated Life of Project: 20 years)
   1. Facility Operating Costs - No additional operating costs required.
   2. Programmatic Operating Expenses Directly Related to the Facility - None.
   3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - At Savannah River approximately $1,025,000 total capital funding will be necessary for five equipment projects which provide additional autoclave baskets, shipping boxes, one shipping truck, two forklifts and safeguards/nuclear criticality control equipment.
   4. GPP or Other Construction Related to Programmatic Effort - At Savannah River approximately $100,000 total capital funding will be necessary for one General Plant Project that modifies the slug recovery process. The modification provides for removal of aluminum jacket and nickel plating from reject slugs, resulting in clean, bare uranium cores for recycling through the slug manufacturing facilities.
   5. Other Costs - None.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: N plant security and surveillance, Richland, Washington

2. Project No. 82-D-118

3. Date A-E Initiated: 3rd Qtr. FY 1982

3a. Date Physical Construction Starts: 4th Qtr. FY 1983

4. Date Construction Ends: 3rd Qtr. FY 1985 [b]

5. Previous Cost Estimate: $4,000
Date: 2/81

6. Current Cost Estimate: $4,400 [b]
Date: 12/82

7. Financial Schedule of Construction Project Funding

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1982	$ 4,000	$ 500[a]	$ 500[a]	$ 25
1983	0	500[a]	500[a]	570
1984	400	2,400	2,400	1,400
1985	0	1,000	1,000	2,405

8. Brief Physical Description of Project

This project will provide for the engineering and construction of security and surveillance improvements to the 100-N Area.

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[a] $500,000 of FY 1982 Appropriation temporarily reprogrammed to project 81-D-143, L Reactor Upgrade. Funds are to be returned in FY 1983.

[b] Lack of funding in FY 1983 delayed project completion 1 year and resulted in an increase in the total estimated cost for the project from $4,000,000 to $4,400,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: N plant security and surveillance, Richland, Washington	2. Project No. 82-D-118

9. Purpose, Justification of Need for, and Scope of Project

The proposed project is the third phase of the Safeguards and Security Upgrade Program. The phased approach of implementation has extended funding authorizations and allowed adjustments for the ever-changing political and social climate affecting industrial security concerns and for adopting conditions and resources to minimize potential maintenance and operating efficiency reductions.

Lack of funding in FY 1983 delayed project completion one year and resulted in an increase in the total estimated cost for the project from $4,000,000 to $4,400,000.

10. Details of the Cost Estimate

1. Engineering, Design and Inspection cost at approximately 14% of construction costs	$ 420
2. Construction costs	3,015
3. Contingency at approximately 28% of above costs	965
Total project cost	$4,400

11. Method of Performance

Design and inspection will be performed by the onsite Architect-Engineer. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

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3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 2nd Qtr. FY 1982

4. Date Construction Ends: 2nd Qtr. FY 1988

5.	Previous Cost Estimate:	$212,181
	Less Amount for PE&D:	0
	Net Cost Estimate:	$212,181
	Date: 3/82	
6.	Current Cost Estimate:	$315,750 a/
	Less Amount for PE&D:	750
	Net Cost Estimate:	$315,000
	Date: 8/82	

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$126,000	$ 45,000 b/	$ 45,000 b/	$ 7,254
1983	8,700 c/	89,700 b/	89,700 b/	27,286
1984	118,600	118,600	118,600	79,574
1985	61,700	61,700	61,700	155,350
1986	0	0	0	37,111
1987	0	0	0	5,665
1988	0	0	0	2,760

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a/ Increase results from the addition of Phase IV.
b/ $2,000,000 of FY 1982 Appropriation temporarily reprogrammed to Project 81-D-143 then returned in FY 1983.
c/ Based on Public Law, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations
2. Project No. 82-D-124

8. Brief Physical Description of Project

This project provides for upgrading facilities for the production of nuclear materials in support of the national defense programs. Physical deterioration that has accumulated as a result of the aging of DOE's production plants at Savannah River, South Carolina; Richland, Washington; Oak Ridge, Tennessee; and Fernald, Ohio will be corrected. Due to the size and diverse nature of this undertaking, work has been subdivided into five separate phases. Phase I (Project 81-D-128) was authorized in FY 1981. The following briefly describes the new subprojects planned to be initiated in Phase IV and those currently contained in Phases II and III; all of which are combined in this line item. The actual scope of work to be performed will be updated prior to the initiation of design to encompass any changes in equipment conditions or priorities.

a. Replace Obsolete Plutonium-238 Facilities, HB-Line, Savannah River, South Carolina (TEC $27,000,000; FY 1984 BA $8,000,000)

This Phase II subproject, the third in a series to replace obsolete HB Line facilities, provides a new building addition for processing plutonium-238. The addition will be located on the top of canyon building 221-H and will be two stories in height and approximately 70 feet by 40 feet in size. Approximately 2300 cubic feet of new glove box cabinets will be provided to permit the radioactive materials to be worked under safe conditions. The ventilation system will be designed to maintain confinement of the materials with air flow directed from clean to progressively more contaminated compartments. Automatic fire suppression will be provided for all process room cabinets. FY 1984 BA will be used to complete construction.

b. Steam and Power Production Facilities, Savannah River, South Carolina (TEC $5,760,000; FY 1984 BA $2,590,000)

This Phase II subproject provides for renovation of wornout and obsolete coal handling components at Savannah River's 484-D Powerhouse. Structural, electrical, and mechanical equipment will be renovated or replaced to improve safety, reliability, and operating efficiency. FY 1984 BA will be used to complete construction.

c. Reactor Fuel Handling Improvements (Part B), Savannah River, South Carolina (TEC $10,000,000; FY 1984 BA $2,500,000)

This Phase II subproject completes a series of safety improvements to the handling equipment used to charge and discharge fuel and target assemblies in Savannah River's P, K, and C reactors. Modifications include: multiplexing all control functions; providing alternate power for moving the discharge machine under emergency conditions; separation of normal and emergency power cables; replacement of motor drives; and upgrading of critical components such as the emergency brake, emergency disengaging clutch and release. FY 1984 BA will be used to complete construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

d. N Reactor Control Systems, Richland, Washington (TEC $8,850,000; FY 1984 BA $4,800,000)

This Phase II subproject includes upgrading of the ball safety systems and horizontal control rod system for shutting down N Reactor under abnormal conditions. Steps will be taken to alleviate the graphite distortion problems that have damaged the reactor ball channels. The electrical controls and ball trip mechanisms will be replaced or overhauled and the ball drain valves renovated. The horizontal control rod upgrade will provide for hardware replacement and improvement of the hydraulic fluid filtering system. FY 1984 BA will be used to complete construction.

e. N Reactor Coolant System Equipment and Instrumentation, Richland, Washington (TEC $9,870,000; FY 1984 BA $5,270,000)

This Phase II subproject is intended to forestall the failure or malfunction of major items of equipment and instrumentation in the reactor cooling system that could force reactor shutdown. Worn or obsolete components will be replaced for increased reliability. The work will include items such as: replacement of hydraulic valve operators; retubing of the final graphite cooling system heat exchanger; and replacement of temperature, pressure, inventory, and flow rate instrumentation. FY 1984 BA will be used to complete construction.

f. Enriched Uranium Processing, Y-12 Plant, Oak Ridge, Tennessee (TEC $9,300,000; FY 1984 BA $4,000,000)

This Phase III subproject provides for the replacement of existing equipment and facilities in Building 9206 and 9212 at the Oak Ridge Y-12 Plant which are dedicated to the processing of enriched uranium in support of DOE production reactor operations. Obsolete or wornout items such as the evaporator system, uranium-aluminum alloy recovery system, evaporator controls, drying furnaces, filtering equipment, etc. will be replaced. Accomplishment of the project will be spread over a period of four years in order to minimize disruption of production operations. The FY 1984 BA will be used to continue construction and procurement.

g. Production Components Replacement, Various Locations (TEC $53,260,000; FY 1984 BA $14,180,000)

This subproject provides for replacement of individual reactor and separations process components that have deteriorated due to age, wear, or the corrosive nature of the materials used in the process operations. At Richland, Washington; fuel failure monitoring system components on the N Reactor will be replaced and backup detection instrumentation

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

installed; N Reactor piping insulation which has been steadily degrading over the past years will also be replaced; instrumentation and controls on the helium gas system, which provides an inert atmosphere to blanket the reactor, will be replaced with more precise units; and the reliability of the equipment annunciator system, which provides data for reactor control and operation, will be improved. At Savannah River, Separations Department components - agitators, vacuum transfer systems, acid recovery columns, dissolver tanks, and instrumentation - will be replaced together with equipment piping, valves, and electrical power distribution systems. Reactor piping and ventilation components that are nearing the end of their lifespan and are no longer repairable will also be renewed together with emergency alarm and communication equipment. The largest of these tasks is replacement of piping system that carries reactor emergency cooling effluent water from the reactor to exterior containment tanks.

h. Replace Production Support Equipment and Systems, Various Locations (TEC $51,814,000; FY 1984 BA $24,314)

This subproject provides for the replacement of support equipment and systems that have become technologically inadequate or that can no longer reliably perform their assigned function. Most tasks will cost less than $500,000. Work includes replacement of radiation monitoring and contamination control equipment at SR; restoration of Power Department mechanical components and instrumentation systems, SR; replacement of obsolete manipulators and laboratory equipment, SR; upgrading of the fuel fabrication facility, RL; restoration of the N Reactor backup steam supply, RL; replacement of heavy mobile equipment at SR; and other similar activities.

i. Replacement Primary Heat Exchangers, Savannah River, South Carolina (TEC $14,000,000; FY 1984 BA $6,000,000)

This subproject provides for procurement of replacement production reactor primary heat exchangers. The 36 heat exchangers now in service have reached the end of their service life and are being replaced as failures occur. Two initial increments of replacement units were provided under Phases I and III of the Restoration Project; $6,000,000 is requested in Phase IV to procure the next increment of replacements.

j. Restore Deteriorated Canyon Cells and Cranes, Savannah River, South Carolina (TEC $10,800,000; FY 1984 BA $6,000,000)

This Phase III subproject replaces canyon cell covers, floor surfaces, and embedden piping that have been corroded by acid vapors to the point that continued deterioration may lead to a loss of production capability. Hot and warm cell canyon cranes will also be restored for increased reliability. FY 1984 BA will be used for procurements and initial construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

k. Renovation of High Voltage Transmission System Control and Monitoring, Savannah River, South Carolina (TEC $18,000,000; FY 1984 BA $9,000,000)

This Phase III subproject replaces approximately 67 miles of supervisory control cables and the existing multi-station relay control systems for Savannah River Plant's 115 KV electrical distribution network. Insulation and shielding on the existing underground cables are estimated to have less than 4 years remaining life. FY 1984 BA will be used to continue construction.

l. Replace Plutonium Precipitator Cabinets, Savannah River, South Carolina (TEC $11,000,000; FY 1984 BA $3,000,000)

This Phase II subproject provides replacement shielded cabinets and process equipment to precipitate and filter plutonium trifluoride from plutonium nitrate solutions. The existing cabinets and equipment are in poor condition and can no longer meet radiation protection or reliability requirements. New tanks, washing stations, and seal pots will be installed together with associated piping, instrumentation and other auxiliaries. FY 1984 BA will be used to continue procurement and construction.

m. JB-Line Restoration, Part A, Savannah River, South Carolina (TEC $8,500,000; FY 1984 BA $500,000)

This Phase II subproject provides for the repair or replacement of JB-Line plutonium processing equipment and systems that have become worn and unreliable. Items to be restored include: the oxidation furnace, holdup and filtrate neutralization cabinets, the hydraulic lift system, breathing air compressors, process piping, and the heating and ventilating system. FY 1984 BA will be used to complete construction.

n. Reactivation of UF_6-UF_4 Reduction Facility, Feed Materials Production Center, Fernald, Ohio (TEC $10,300,000; No FY 1984 BA)

This Phase II subproject covers the reactivation and replacement of existing equipment at the Feed Materials Production Center which will be used to reduce uranium hexafluoride (UF_6) to uranium tetrafluoride (UF_4). The items proposed for reactivation or replacement include autoclave vaporizers, ammonia dissociators, and the refrigeration system for recovery of anhydrous hydrogen fluoride.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

o. Uranium Target Plating Line, Savannah River, South Carolina (TEC $4,500,000; FY 1984 BA $2,500,000)

This Phase III subproject will provide an automated plating line to nickel plate uranium slugs in the fuel processing area at the Savannah River Plant. The automated plating line will replace an existing line, which is no longer capable of maintaining required production levels and will be removed. The new plating line will consist of two sections, one for anodic etching and the other for nickel plating. It will be installed in space available in the existing uranium slug manufacturing building, adjacent to the present plating line. FY 1984 BA will be used to complete the subproject.

p. Restoration of Special Materials Processing Facilities, Feed Materials Production Center, Fernald, Ohio (TEC $9,046,000; FY 1984 BA $6,446,000)

This Phase III subproject provides for restoration of a furnace used to melt and cast uranium. New crucible loading and burnout stations will be installed for this furnace and the obsolete burnout stations in Plant 5 will be reconditioned. The existing vacuum pumps, controllers, voltage regulators, and mold tanks in Plant 5 will also be restored. FY 1984 BA will be used to complete the subproject.

q. Modifications to Radiological Support Facilities, Savannah River, South Carolina (TEC $9,000,000; FY 1984 BA $2,500,000)

This new subproject proposes an approximately 25,000 square foot addition to the existing Radiological and Environmental Science Laboratory. About 60 percent of the building area will be devoted to laboratories and about 40% to offices and support facilities. This project is required to support the expanding programs of the Savannah River Laboratory Environmental Sciences Section (ESS) and the Savannah River Plant Health Protection Department (HP). FY 1984 BA will be used to initiate design, procurement, and construction.

r. Powerhouse Instrumentation and Coal Handling Facilities, Savannah River, South Carolina (TEC $6,000,000; FY 1984 BA $2,000,000)

This new subproject proposes to restore the instrumentation and coal handling systems in the Stoker Areas of the Plant. These facilities have been in service 25 years and have suffered extended corrosion over their life, and they are becoming increasingly unreliable even with extensive maintenance. Replacement of the moderate to severely damaged parts of the coal handling equipment is required to maintain the safety and reliability of the powerhouse coal facilities. FY 1984 BA will be used to initiate design, procurement and construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations
2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

s. Production Control Facility, Savannah River, South Carolina (TEC $23,000,000; FY 1984 BA $10,000,000)

This Phase III subproject provides a 20,000 square foot addition to the existing Production Control Facility, Building 772-F, to analyze highly radioactive process samples from dissolution of fuel tubes and target slugs. These analyses are used to determine the quantity of plutonium produced in the Savannah River reactors and to measure the results of succeeding chemical separations steps. Operating delays are already being experienced due to slow answers and inaccurate results. With the increased separations throughput that will occur when L Reactor is brought on-line problems will become more frequent. Further, the overall condition of the existing facility has deteriorated to a level where the risk of major long term outage due to accident or equipment failure is excessive. The addition will contain 17 laboratories, four shielded analytical cells, a control room, and necessary service facilities. FY 1984 BA will be used to continue design, procurement, and construction.

t. JB-Line Restoration, (Part B), Savannah River, South Carolina (TEC $15,000,000; FY 1984 BA $5,000,000)

This new subproject upgrades and overhauls JB-Line facility equipment to restore equipment reliability to meet Pu-239 production commitments. Overhaul will consist of replacement of instrumentation and equipment with state-of-the-art design where practical, replacement of wornout equipment, regasketing of piping and upgrades of cabinet panel seal and H&V system. Overhauls on each glovebox will be performed in a manner to minimize downtime. The following are five areas of work for JB-Line restoration covered in Part B:

(1) Complete duct piping upgrades.
(2) Overhaul Recovery Process Equipment.
(3) Miscellaneous Mechanical Line Upgrades.
(4) Replace Anion and Recovery Control Panels.
(5) Install new solution transfer vacuum system.

FY 1984 BA will be used to initiate design, procurement and construction.

9. Purpose, Justification of Need for, and Scope of Project

The Restoration Project directly supports the department's assigned mission of providing nuclear materials for national defense needs. The facilities and equipment involved are the prime source of weapon-grade materials within the United States. It is therefore necessary that excessive breakdowns be avoided and that production needs be met in a safe, effective, and efficient manner.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

9. Purpose, Justification of Need For, and Scope of Project (cont'd)

The majority of Nuclear Material Production's plants are now over twenty-five years old and have considerable age deterioration. Some of the equipment is obsolete and/or replacement parts are unavailable. In many cases vendors who furnished the equipment twenty-five years ago are no longer in business. Further, transitions in safety, process, and regulatory requirements over the years have caused some original facilities to become deficient with respect to the current state-of-the-art.

Due to funding restraints; line item construction, general plant projects and capital equipment appropriations have been insufficient to correct these deficiencies as they developed. Items previously considered deferable have gradually reached the point of urgency.

The measures necessary to restore the production complex to a condition adequate to meet mission requirements was submitted to Congress in June 1979. Execution is being achieved through this five phase construction effort and associated operating funded activities. The final escalated cost of both activities will be approximately $460 million.

10. Details of Cost Estimate[a]

	Item Cost	Total Cost
A. Engineering, Design and Inspection Costs at approximately 19% of construction costs, Item B ...		$ 36,090[b]
B. Construction Cost		199,902
(1) Improvements to land	$ 207	
(2) Buildings	35,947	
(3) Special Facilities	160,305	
(4) Utilities	3,443	

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[a] The above estimates are based on varying degrees of design completion, ranging from conceptual to Title II.

[b] Excludes PE&D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

10. Details of Cost Estimate (cont'd)

		Item Cost	Total Cost
C.	Removal Costs Less Salvage		1,925
D.	Equipment		24,870
	Subtotal		262,787
E.	Contingency at approximately 20% of above cost		52,213
	Total Project Cost		$315,000

11. Method of Performance

Design will be performed by both the operating contractors and negotiated architect-engineer contracts. Construction and procurement will be accomplished by the operating contractors, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
A. Total project funding									
(1) Total facility costs									
(a) Construction line item	$ 0	$ 7,254	$27,286	$ 79,574	$155,350	$37,111	$ 5,665	$ 2,760	$315,000
(b) Plant Engineering and Design (PE&D)	0	0	750	0	0	0	0	0	750
(c) Operating Expenses Funded Equipment	0	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 7,254	$28,036	$ 79,574	$155,350	$37,111	$ 5,665	$ 2,760	$315,750
(2) Other project funding									
(a) Conceptual design and engineering studies	$ 1,985	$ 3,472	$ 665	$ 50	$ 0	$ 0	0	$ 0	$ 6,172
(b) Other project related costs.	600	10,389	18,545	$ 15,047	9,185	7,379	0	0	61,145
Total other project funding.	$ 2,585	$13,861	$19,210	$ 15,097	$ 9,185	$ 7,379	$ 0	0	$ 67,317
Total project funding (Item 1 & 2)	$ 2,585	$21,115	$47,246	$ 94,671	$164,535	$44,490	$ 5,665	$ 2,760	$383,067

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, and IV, various locations

2. Project No. 82-D-124

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

B. Total Related Funding Requirements (Estimated Life of Project = 20 years)

(1) Facility Operating Costs	$(615)
(2) Programmatic Operating Expenses Directly Related to the Facility	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or other Construction Related to the Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$(615)

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
- (1) Total Facility Costs
  - (a) Construction line item - No narrative required.
  - (b) PE&D - FY 1983.
  - (c) Expense funded equipment - None.
- (2) Other Project Funding
  - (a) Conceptual design - No narrative required.
  - (b) Other project related costs - This item includes:
    - o $13,000,000 for decontamination and disposal of obsolete HB-Line facilities after completion of the new subprojects.
    - o $9,380,000 for liaison and startup.
    - o $5,965,000 for program management and administration.
    - o $32,800,000 for operating funded repairs and renovation.

B. Total Related Funding Requirements

This project will provide replacement or modification of existing facilities. The modified facilities are intended to be used in lieu of the facilities they replace. Expenses to operate and maintain the modified facilities will be essentially the same or less than the existing facilities. The savings shown result from reduced operating cost.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Reactor safety and reliability, Various Locations

2. Project No. 82-D-126

3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 3rd Qtr. FY 1982

4. Date Construction Ends: 4th Qtr. FY 1988

5. Previous Cost Estimate: $61,600
Date: 12/81

6. Current Cost Estimate: $63,250
Less PE&D (FY 1983): 550
Net Cost Estimate: $62,700
Date: 12/82

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Cost
1982	$42,900	$ 4,000[a]	$ 4,000[a]	$ 1,562
1983	0	9,000[a]	9,000[a]	4,050
1984	0	6,000	6,000	4,800
1985	10,800	34,700	34,700	28,000
1986	9,000	9,000	9,000	17,550
1987	0	0	0	5,000
1988	0	0	0	1,738

8. Brief Physical Description of Project

This project provides for additional improvements in the safety systems of the Savannah River plutonium production reactors and the N production reactor at Richland, Washington. Included are subprojects to improve the safety controls and shutdown circuitry of four Savannah River production reactors (P, C, K, and L), a subproject to direct and contain Richland N-Reactor primary loop and fuel basin coolant water in a holdup facility for decay of short lived isotopes, and a subproject to mitigate the consequences of a potential nuclear accident by providing remote monitoring facilities.

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[a] $2,000,000 of FY 1982 Appropriation of $6,000,000 temporarily reprogrammed to project 81-D-143, L Reactor Upgrade. Funds were returned in FY 1983.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

8. Brief Physical Description of Project (cont'd)

The following briefly describes each subproject:

a. Remote Detection and Controls, Reactor Areas, Savannah River, South Carolina (TEC $13,300; FY 1984 BA $600)

The equipment will monitor and control those functions required to establish safe shutdown conditions for the P,C,K, and L production reactors to remove decay heat from components in the reactor, and to minimize releases of radioactive materials to the environment. These functions include monitoring of water levels, temperatures, pressures, and activity levels, and control of pumps, valves, fans and dampers. Improved capability to test the monitoring and control devices during reactor operation or brief outages will be included.

The existing remote detection and control equipment is a relay logic system that requires excessive maintenance, has limited capability for testing during reactor operation, requires excessive time for data interpretation, and is not in a location where it can be staffed continuously by the reactor operating department.

The TEC for this subproject has decreased by $2,700,000 from the FY 1983 request as the result of completed conceptual design and better definition of project requirements.

The FY 1984 funds will be used to continue design and limited procurement.

b. Reactor Shutdown Circuitry, Savannah River, South Carolina (TEC $20,000; No FY 1984 BA)

This project provides more reliable electrical circuits to control the shutdown systems of the P, C, K, and L production reactors at the Savannah River Plant. It also provides equipment for testing these circuits and for control of fires. The primary shutdown system consists of neutron absorbing safety rods that fall by gravity to scram the reactor on a signal from a manual pushbutton or any of 28 process variables. The secondary shutdown system consists of a neutron absorber in aqueous solution that is injected into the reactor coolant on activation by a manual signal, by verified high temperatures in the reactor tank, or by failure of the safety rods to fall after a scram signal.

Modifications to the electrical circuitry include (1) physical separation of cables and process sensors that carry redundant scram signals, (2) installation of cables with improved resistance to fire and radiation damage, (3) addition of redundant monitors and relays, and (4) revisions to eliminate undetectable single failures that could disable a system. Circuit testing features will be added where necessary, and fire detection and smoke removal equipment will be provided as determined by the location and function of each circuit.

The TEC for this subproject has been increased by $1,500,000 over the FY 1983 request to provide for revised cost estimates resulting from project schedule delays necessitated by funding restrictions in fiscal years 1982 and 1983.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor Safety and Reliability, Various Locations   2. Project No. 82-D-126

8. Brief Physical Description of Project (cont'd)

c. Reactor Simulator and Expanded Training Facilities, Savannah River, South Carolina (TEC $17,100; FY 1984 BA $4,000)

This project provides a new training facility for the Savannah River production reactor operators. The new facility will replace the existing training facilities which are primarily mobile, modular offices converted to classrooms.

A new building, located in the Savannah River 100-C production reactor area, will provide space for classrooms, offices, video equipment facilities and a production reactor control room simulator. The building will be masonry construction with approximately 30,000 square feet of floor area. The simulator will be a computer-driven replica of the reactor control room. The computers will be in a dedicated room and will have an instrument maintenance room nearby. The computers will provide for real-time and slow-time simulation of normal reactor operations and reactor emergencies.

The FY 84 funds will be used to continue fabrication and on-site construction.

d. Supplemental ECCS/FS Supply, Richland, Washington (TEC: $1,600; No FY 1984 BA)

This project provides improved reliability and additional raw water pumping capacity for the N-Reactor emergency cooling water system so that the total demands of the Emergency Core Cooling System (ECCS) and the fog spray system (FS) can be supplied concurrently assuming a single active component failure. This will be accomplished by installing a third low-lift pump at the river pump house (Building 181-N) and connecting its discharge pipe to the two existing raw water system pipes, just downstream from Building 181-H.

e. Control Room Habitability, Richland, Washington (TEC: $6,300; no FY 1984 BA)

This project provides for the design and construction of modifications to the N Reactor control room that would allow a minimum five-day insolation period following a loss of coolant accident without limiting personnel to the use of fresh air breathing apparatus. The project will upgrade the leak resistance to toxic or radioactive gases, modify the ventilation system, and provide adequate emergency kitchen and sanitary facilities.

f. N Reactor Liquid Effluent Disposal Crib, Richland, Washington (TEC: $2,700; FY 1984 BA $1,400)

This project provides for the design and construction of a new liquid effluent disposal crib for N-Reactor to replace the existing 1301-N crib and outfall trench. The new facility will be sited inland of the existing 1301-N crib and will be designed to handle normal N-Reactor area liquid effluent disposal flow streams. A diversion to the N-Reactor emergency disposal basin (1312-N) will be provided to handle overflows which could occur under emergency conditions. Water flow to the new crib facility will be by gravity. FY 1984 funding will be used for completion of crib construction.

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

8. Brief Physical Description of Project (cont'd)

g. Reactor Emergency Support Center, Richland, Washington (TEC: $1,700; no FY 1984 BA)

This project provides for the design and installation of a remote monitoring system that will provide for display of vital reactor plant information needed to mitigate the consequences of a nuclear accident. The vital information will be displayed in such a manner as to permit the emergency support team to evaluate the data and provide guidance to reactor control room personnel and other area emergency personnel. The display and monitoring equipment will be installed remotely from the Reactor control room to eliminate confusion and congestion in the control room. Redundant voice communication systems will be provided between the control room and support center.

Project scope has been revised and better defined over the FY 1983 Congressional submission. The FY 1983 subproject item 8.d. Production Reactor Operator Assistance, Various Locations (TEC $20,900,000) has been replaced by items 8.c., d., and e., which constitute a more detailed and site specific breakdown than the FY 1983 submission. Item 8.g. above is a replacement for item 8.e. Design Basis Volcanic Eruption Protection, Richland, Washington (TEC $3,000,000) in FY 1983 submission and is justified due to increased programmatic emphasis to obtain a remote monitoring capability during postulated accident scenarios and recent assessments of reduced vulnerability for operational interruptions due to a volcanic event.

In addition, item 8.c. N Reactor Primary Coolant Holdup Facility, Richland, Washington (TEC $3,200,000) in the FY 1983 submission has been replaced by item 8.f. above. The title change and description more accurately reflect the construction efforts planned. The subproject function remains similar to that outlined in the FY 1983 submission.

9. Purpose, Justification of Need for, and Scope of Project

The many governmental (Kemeny Commission, Rogovin Report, Nuclear Regulatory Commission Lessons Learned Studies) and industry (National Society of Professional Engineers, Institute of Nuclear Power Operations, etc.) studies conducted to ascertain the lessons to be learned from the Three Mile Island nuclear reactor accident have resulted in improved standards for reactor operations. The independent assessments conducted by the department and the operating contractors for production reactors have established facility modifications required to be consistent with new industry standards. These modifications will reduce the probability of accidents in the nuclear production

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

reactors and enhance the safety of operations. In addition, improvements in the ability of reactor operators to manage emergency conditions have also been mandated. These improvements are of special applicability for production reactors due to the importance of their mission in establishing the national defense posture. The fact that Savannah River's P, K, C, and L reactors are over 26 years old and the Richland N-Reactor is a 1960 vintage design places added emphasis on the need to incorporate equipment, instrumentation and monitoring devices consistent with post-TMI practices.

10. Details of Cost Estimate[a]

	Item Cost	Total Cost
a. Engineering, Design and Inspection Costs at 15% of construction costs , Item b		$ 6,700[b]
b. Construction Costs		43,300
(1) Buildings	$ 2,870	
(2) Special Facilities	38,900	
(3) Utilities	1,530	
c. Removal Cost Less Salvage		400
Subtotal		50,400
d. Contingency at approximately 26% of above costs		12,850
Total Project Cost		$63,250 [b]

11. Method of Performance

Design will be performed by the operating contractor or onsite cost plus award fee (CPAF) firm. Construction and procurement will be accomplished by the operating contractor or CPAF construction contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

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[a] Based on conceptual design which is approximately 80% complete.
[b] Includes $550,000 in PE&D funds.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor Safety and Reliability, Various Locations   2. Project No. 82-D-126

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding									
1. Total facility costs									
(a) Construction line item..............	0	$ 1,562	$ 4,050	$ 4,800	$28,000	$17,550	$ 5,000	$ 1,738	$62,700
(b) Plant Engineering and Design (PE&D)	0	0	550	0	0	0	0	0	550
(c) Expense Funding Equipment..........	0	0	0	0	0	0	0	0	0
(d) Inventories..........................	0	0	0	0	0	0	0	0	0
Total Facility Costs...............	0	$ 1,562	$ 4,600	$ 4,800	$28,000	$17,550	$ 5,000	$ 1,738	$63,250
2. Other project funding									
(a) Conceptual design and engineering studies.........................	$ 400	$ 100	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 500
(b) Other project related costs......	145	450	450	450	330	0	0	0	1,825
Total other project funding......	$ 545	$ 550	$ 450	$ 450	$ 330	$ 0	$ 0	$ 0	$ 2,325
Total project funding (Item 1 and Item 2).............	$ 545	$ 2,112	$ 5,050	$ 5,250	$28,330	$17,550	$ 5,000	$ 1,738	$65,575

b. Total Related Funding Requirements	
1. Facility Operating Costs	$1,200
2. Programmatic Operating Expense Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4. GPP or other Construction Related to the Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$1,200

1. Title and location of project: Reactor Safety and Reliability, Various Locations	2. Project No. 82-D-126

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
  (1) Total Facility Costs
    (a) Construction Line Item - no narrative required.
    (b) PE&D - FY 1983 PE&D will provide for A-E services for subprojects 8.e. Control Room Habitability and 8.f. N Reactor Liquid Effluent Disposal, both at Richland, Washington.
    (c) Expense funded equipment - none.
    (d) Inventories - none.
  (2) Other Project Funding
    (a) Conceptual design includes preparation of a cost estimate for project authorization and improving equipment design.
    (b) Other project related funding - funding in section 12-a-(2)(b) is for Plant liaison, computer software and programming, and startup costs.

B. Total Related Funding Requirements
  (1) Facility Operating Costs - The Savannah River reactor simulator and expanded training facilities have an estimated life of 25 years. Approximately $1,200,000 per year is expected to be spent for additional personnel to man the facilities.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and Location of Project: Safeguards Improvements,
Savannah River, South Carolina

2. Project No. 82-D-127

3. Date A-E Work Initiated: 1st Qtr. FY 1981 [a]

3a. Date Physical Construction Starts: 1st Qtr. FY 1983

4. Date Construction Ends: 4th Qtr. FY 1986

5. Previous Cost Estimate: $37,800
Less PE&D 1,400
Net Cost Estimate: $36,400[b]
Date: 2/81

6. Current Cost Estimate: $36,000
Less PE&D (FY 81) 1,400
Net Cost Estimate: $34,600
Date: 12/82

7. Financial Schedule of Construction Project Funding

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$34,600	$ 1,000[c]	$ 1,000[c]	$ 0
1983	0	1,000[c]	1,000[c]	700
1984	0	7,000	7,000	3,500
1985	0	20,000	20,000	18,000
1986	0	5,600	5,600	12,400

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[a] PE&D funded.

[b] TEC reduced as a result of JB-Line accountability systems being deleted from project.

[c] $1,000,000 of FY 1982 Appropriation of $2,000,000 temporarily reprogrammed to Project 81-D-143, L Reactor Upgrade. Funds were returned in FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Safeguards improvements,
Savannah River, South Carolina

2. Project No. 82-D-127

8. Brief Physical Description of Project

The project provides new facilities to control access to the P, K, L, and C reactor areas and new systems to detect unauthorized entry.

9. Purpose, Justification of Need for, and Scope of Project

Requested FY 1984 appropriations and obligations will be used to continue engineering and construction efforts.

10. Details of Cost Estimate[a/]

		Item Cost	Total Cost
a. Engineering Design and Inspection at approximately 17% of Construction Costs, Item B		$	$ 4,200[b/]
b. Construction Costs			23,870
1) Improvements to Land		2,290	
2) Buildings		1,820	
3) Special Facilities		19,760	
- Elect. Equipment	$13,370		
- Elect	6,160		
- H&V	210		
- Piping	20		
c. Removal Costs			590
Subtotal (Items a, b, and c)			$28,660
d. Contingencies at approximately 26% of above costs			7,340
e. Total project cost			$36,000

11. Method of Performance

Design will be by the operating contractor. Construction and procurement will be by the operating contractor utilizing, to the extent feasible, fixed-price subcontracts awarded on the basis of competitive bidding.

[a/] Based on completed conceptual design.

[b/] Includes $1,400,000 in PE&D funds for K reactor.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Safeguards Improvements,
Savannah River, South Carolina

2. Project No. 82-D-127

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
A. Total Project Funding							
1) Total Facility Costs							
a. Construction Line Item	$ 0	$ 0	$ 700	$ 3,500	$18,000	$12,400	$34,600
b. PE&D	825	575	0	0	0	0	1,400
c. Expense Funded Equipment	0	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 825	$ 575	$ 700	$ 3,500	$18,000	$12,400	$36,000
2) Other Project Funding							
a. R&D (Conceptual Design)	$ 500	$ 0	$ 0	$ 0	$ 0	$ 0	$ 500
(Engineering Studies)........	85	65	50	0	0	0	200
b. Other Project Related Costs.....	150	450	500	500	100	50	1,750
Total Other Project Funding.....	$ 735	$ 515	$ 550	$ 500	$ 100	$ 50	$ 2,450
Total Project Funding	$ 1,560	$ 1,090	$ 1,250	$ 4,000	$18,100	$12,450	$38,450

B. Total Related Funding Requirement (estimated life of project: 25 years)

	Annual Cost
1) Facility Operating Cost	$ 1,630
2) Programmatic Operating Expense Directly Related to the Facility	0
3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to the Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 1,630

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Safeguards improvements, Savannah River, South Carolina	2. Project No. 82-D-127

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
  (1) Total Facility
    a. Construction Line Item - No narrative required.

    b. PE&D - FY 1981 for advanced design of the safeguards facilities.

    c. Expense Funded Equipment - None.

    d. Inventories - None.

  (2) Other Project Funding
    a. R&D - A total of $700,000 has been spent for conceptual design and engineering studies costs associated with this project. No other R&D funds will be required.

    b. Other project related costs - Approximately $400,000 is expected to be spent for preparation of procedures and for training of operating and maintenance personnel for the safeguards facilities provided by this project. An additional $650,000 is expected to be spent for plant liaison during the life of this project, beginning during conceptual design. Approximately $700,000 is expected to be spent for computer software and programming.

B. Total Related Funding Requirements
  (1) Facility Operating Costs
    Approximately $1,630,000 is expected to be needed for additional guards.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Plant perimeter security systems upgrade, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 82-D-128

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date Physical Construction Starts: 4th Qtr. FY 1982

4. Date Construction Ends: 4th Qtr. FY 1985[a]

5. Previous Cost Estimate: $4,400
Date: 12/80

6. Current Cost Estimate: $5,400[a]
Date: 12/82

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1982	$4,400	$1,000	$1,000	$ 247
1983	0	0	0	753
1984	0	3,000	3,000	2,000
1985	1,000	1,400	1,400	2,400

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[a] The TEC increase reflects a fifteen month stretchout of the project completion and additional project scope due to insufficient FY 1983 funds. Additional work due to a two-phase construction effort includes: (a) temporary construction access crossing the secured perimeter; and (b) duplication of construction tasks and temporary provisions.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Plant perimeter security systems upgrade, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho	2. Project No. 82-D-128

8. Brief Physical Description of Project

This project provides for the design and construction of security protective measures at the Idaho Fuels Processing Facility (IFPF).

9. Purpose, Justification of Need for, and Scope of Project

Some of the specific requirements for protected areas as stated in the DOE Orders are as follows: (1) protected areas shall be subject to a system of access controls, (2) a sufficient level of illumination shall be provided at all points on the perimeter to permit assessment in the event of unauthorized attempts to penetrate the protected area, (3) a hardened security force communications center shall be established and shall have periodically tested radio and telephone channels of communication with local law enforcement agencies. There also shall be an emergency alternate communications capability from a secondary station for use in event the primary station is compromised, (4) perimeter intrusion alarm systems or equivalent means of providing early detection shall be used at the perimeter of protected areas of material access areas, (5) all detection/alarm devices, including transmission lines to annunciators, shall be failure and tamper indicating. Such devices shall be connected to monitor/display panels in the hardened security force communications center. An alternate alarm annunciation point (or a comparable alternate capability) shall be provided in a location which is continuously manned by cleared personnel and which provides a second indication of an alarm such that a response can be initiated in the event the primary station is compromised and (6) personnel, packages, briefcases, and similar containers, and all vehicles shall be subject to search at the entrance to a protected area. The search on entering, when performed, may be made with DOE-approved detection equipment designed to assure that explosives, weapons, or other prohibited articles are not introduced.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Plant perimeter security systems upgrade, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 82-D-128

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10. Details of Cost Estimate[b]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 15% of construction costs, items b and c		$ 550
b. Construction costs		2,030
1. Improvements to land: fencing, roads, etc.	$400	
2. Building, 1700 sq. ft. @ $217 a sq. ft.	370	
3. Special facilities: new perimeter alarms, data processor, communication link interface equipment, etc.	860	
4. Utilities: perimeter lights, etc.	400	
c. Standard equipment: alarm modules, CCTV equipment, etc.		1,540
d. Demolition and removals		10
e. Contingency at approximately 31% of above costs		1,270
Total Project Cost		$5,400

11. Method of Performance

Design will be accomplished by negotiated architect-engineer contract and construction and procurement by fixed price contracts award on the basis of competitive bids, except for alarm equipment which will be Government Furnished Equipment.

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[b] This cost estimate is based on a completed conceptual design and partial completion of both Title I (preliminary) and Title II (definitive) designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Plant perimeter security systems upgrade, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 82-D-128

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	Total
A. Total Project Costs				
1. Total Facility Cost				
(a) Construction Line Item	$ 1,000	$2,000	$2,400	$5,400
(b) PE&D	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0
(d) Inventories	0	0	0	0
Total Facility Costs	1,000	2,000	2,400	5,400
2. Other Project Costs				
(a) R&D necessary to complete construction	220	0	0	220
(b) Other Project Related Costs	585	190	380	1,155
Total Other Project Costs	805	190	380	1,375
Total Project Costs	$ 1,805	$2,190	$2,780	$6,775

B. Other Related Funding Requirements

1. Facility Operating Costs	$ 160
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$ 160

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Plant perimeter security systems upgrade, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 82-D-128

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Costs
  1. Total Facility
    a. Construction Line Item - no narrative required.
    b. PE&D - no narrative required.
    c. Expense Funded Equipment - no narrative required.
    d. Inventories - no narrative required.
  2. Other Project Costs
    a. R&D Necessary to Complete - approximately $220,000 was spent for conceptual design.
    b. Other Project Related Funding - approximately $1,155,000 will be spent for project support during design and construction and for testing and startup of the completed facilities.

B. Other Related Funding Requirements

It is estimated the facility will be used 25 years for its programmatic purpose.

1. Facility Operating Costs - Facility operating costs amount to $100,000 annually for electricity and $60,000 annually for maintenance of electronic equipment.
2. Programmatic Operating Expenses Directly Related to the Facility - no narrative required.
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility - no narrative required.
4. GPP or Other Construction Related to Programmatic Effort - no narrative required.
5. Other Costs - no narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date physical construction starts: 4th Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $46,000
Date: 12/81

6. Current cost estimate: $46,000
Less amount for PE&D: 0
Net cost estimate: $46,000
Date: 12/82

7. **Financial Schedule**

Fiscal Year	Authorization	Appropriation	Obligations	Cost
1982	$40,000	$10,500[a]	$10,500[a]	$ 1,053
1983	0	$17,500[a]	$17,500[a]	$ 6,000
1984	6,000	$18,000	$18,000	$10,200
1985	0	0	0	$19,000
1986	0	0	0	$ 9,747

8. **Brief Physical Description of Project**

The Idaho Fuels Processing Facility (IFPF) supports the nation's defense by processing naval nuclear propulsion fuels and thus closes the Navy's fuel cycle while providing fuel for the DOE production reactors. The Navy has forecasted a forty-year mission for the IFPF which will increase its base processing load substantially beyond present capacity.

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[a] $3,500,000 of FY 1982 Appropriation of $14,000,000 temporarily reprogrammed to Project 81-D-143, L Reactor Upgrade. Funds were returned in FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade,
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

8. Brief Physical Description of Project (cont'd)

This project addresses certain high priority requirements identified for interim, reliable nuclear fuel processing at IFPF by providing for Title I and Title II design, Advance Procurement, Title III Inspection, and Construction of systems and facilities urgently needed for the continued safe and orderly operation of the IFPF. Specifically, the project will provide the following: (1) refurbishment of the main stack, (2) modification of the off-gas system, (3) modification of the Process Equipment Waste (PEW) system, (4) upgrade of the existing product denitration system, (5) replacement of key non-geometrically safe vessels with critically safe vessels, and (6) construction of an improved solvent treatment system.

Support systems (e.g., utilities, instrumentation, etc.) will be provided such that all modifications will be fully operable at construction completion. Design will consider future expansion plans and will be compatible with these plans to the greatest practicable extent and will include Title I studies to confirm future interfaces.

The budget authority level requested in FY 1984 is for continuation of facility procurement and construction activities.

9. Purpose, Justification of Need for, and Scope of Project

This project is needed to immediately correct problem areas which exist at the IFPF. Without these upgrades, long-term use of the IFPF may be jeopardized by increasing safety and reliability problems and concerns. A modification to the existing processing facility will be proposed in the near future which will safely and efficiently meet the long-term mission.

The existing IFPF processing facility was constructed 25 years ago and several plant systems have deteriorated through normal wear and corrosion. This deterioration decreases the safety, reliability, functional use, and efficiency of several process systems. This project is needed to preclude the following occurrences: (1) prolonged shutdown of the IFPF due to an inadvertent criticality, (2) prolonged shutdown of the IFPF due to failure of a key equipment item, (3) accumulation of personnel radiation exposure beyond as-low-as-reasonably-achievable levels (ALARA), and (4) unacceptable safety risks due to previously described items (1), (2), and (3). Loss of a key process would prevent operation of other critical IFPF processes and seriously impair the ability to process nuclear fuel. Such a shutdown would preclude recovery of valuable enriched uranium resources and the return of these resources to productive use.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade,
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Structural modifications to the stack are necessary for continued operation of the IFPF. The existing 25-year-old reinforced concrete stack at IFPF has deteriorated from acid attack and has many hairline cracks. Mortar bonding between some of the acid-proof bricks in the stack liner is missing or badly deteriorated which could allow the bricks to fall out and corrosive gases to enter the annular space between the liner and concrete support shell with subsequent attack on the concrete. Core sections removed from the stack in 1978 allowed both visual observation and structural evaluation of the damage and indicated marginal structural integrity. Therefore, emergency repairs to temporarily stabilize the stack have been made. This project will provide for the structural strengthening of the existing chimney to satifsy current seismic standards as well as stabilization of the existing brick liner.

The existing off-gas system no longer operates with the margins of safety and reliability considered appropriate for IFPF missions. For example, the Process Building process off-gas systems filtration has been a signficiant source of personnel radiation exposure when the plant is operating. Presently, the filters become loaded and require replacement every three to five days. Filter changeout is done manually resulting in near unacceptable operating and maintenance personnel radiation exposure. The existing process off-gas system uses the Atmospheric Protection System (APS) as primary filtration. Because the APS has been used for primary protection, the APS prefilter has accumulated considerable contamination. It has no means of internal decontamination, thus, the radiation levels in the prefilter room have risen. Also, the valves, instrumentation, and other routinely used equipment are located (operable and readable) only in the prefilter room adjacent to the prefilter. Both situations result in repeated radiation exposure to operating and maintenance personnel.

The Process Equipment Waste (PEW) evaporator feed tank provides the sole source of surge capacity for the Process Equipment Waste/Cell Floor Drain (PEW/CFD) transfer system. If it were to fail, it would necessitate complete shutdown of the IFPF aqueous liquid waste system. The tank has received corrosive solutions containing undissolved solids for more than 25 years. There is no usable personnel access, decontamination capability, inspection capability, or solids removal capability for this vessel. This has resulted in the undesirable existing conditions:

(1) The usable storage volume of the tank has been reduced by 15% due to accumulation of the undissolved solids received by the vessel.

(2) The integrity of the tank wall is unknown because the effects of the corrosive solutions to which it has been exposed are not easily determined.

The existing product denitration system has a primary system vessel which is not critically-safe by geometry. The operating reliability is poor; there have been minor accidental contaminations of working areas. In addition, the process instrumentation is old and is located adjacent to the denitration vessel in a contamination-prone area.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade,
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

There are systems in which criticality safety is a concern. For example, the existing uranium salvage vessels are made critically safe by using internal boron poison plates. These poison plates may be partially dissolved by corrosion due to chemicals used in the system. Since no practical method is available to evaluate the poison and vessel integrity on a routine basis, projections of the vessel and poison life are not available. In some of the systems the instrumention used for process control is outmoded and subject to malfunction, thus accountability and inventory control may be compromised.

The present solvent treatment system generates unnecessarily large quantities of spent solvent and permits discharge of residual amounts of radionuclides. The improved solvent treatment system will cleanup this exhaust.

10. Details of Cost Estimate[b/]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 26% of construction costs, item b		$ 7,400
b. Construction costs		28,400
(1) Stack	$ 8,000	
(2) Solvent Treatment System	1,400	
(3) Atmospheric Protection System	2,000	
(4) Process Equipment Waste System	4,000	
(5) Rework Cell Vessels	5,000	
(6) Denitration System	7,900	
(7) Vessel Off-Gas	100	
Subtotal		$ 35,800
c. Contingency at approximately 29% of above cost		10,200
Total Project Cost		$ 46,000

11. Method of Performance

Design, construction and procurement will be accomplished by prime contracts and/or subcontracts awarded on the basis of competitive bidding.

[b/] The above estimates are based on completed conceptual and advanced conceptual designs, and partially completed Title I (preliminary) and Title II (definitive) designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade,
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

12. Funding Schedule of Project Funding and Other Related Funded Requirements (cont'd)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total Project Funding							
1. Total Facility Cost							
a. Construction Line Item	$ 1,053	$ 6,000	$10,200	$19,000	$ 9,747	$ 0	$ 46,000
b. PE&D	0	0	0	0	0	0	0
c. Expensive Funded Equipment	0	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 1,053	$ 6,000	$10,200	$19,000	$ 9,747	$ 0	$ 46,000
2. Other Project Funding							
a. R&D Necessary to complete construction	$ 3,157	$ 280	$ 160	$ 60	$ 30	$ 0	$ 3,687
b. Other Project Related Costs	863	825	1,992	3,300	3,770	1,150	11,900
Total Other Project Funding	$ 4,020	$ 1,105	$ 2,152	$ 3,360	$ 3,800	$ 1,150	$ 15,587
Total Project Funding (Items 1 & 2)	$ 5,073	$ 7,105	$12,352	$22,360	$13,547	$ 1,150	$ 61,587

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

12. Funding Schedule of Project Funding and Other Related Funded Requirements (cont'd)

B. Total Related Funding Requirement

1. Facility Operating Costs	$ 0*
2. Programming Operating Expenses Directly Related to the Facility	0*
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0*
4. GPP or other construction related to Programmatic Effort in the Facility	0*
5. Other Costs	0*
Total Other Related Annual Funding Requirements	$ 0*

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

1. Total Facility
   - a. Construction Line Item - No narrative required.
   - b. PE&D - No narrative required.
   - c. Expense Funded Equipment - No narrative required.
   - d. Inventories - No narrative required.

2. Other Project Funding
   - a. R&D necessary to complete construction - Approximately $3,100,000 was expended on conceptual design and an approximate additional $587,000 will be needed to support process development R&D and facilities mockups.

   - b. Other Project Related Funding - Approximately $11,900,000 will be spent on project support and facility startup. Project Support will extend through design and construction. Project support includes design reviews, independent checks and calculations, trade-off studies, safety analysis report preparation, vendor data review and procurement support.

B. Total Related Funding Requirements

No incremental change in funding is required for programmatic operation of the upgraded facility.

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*Operating costs and programmatic costs for the upgraded processing facilty will not change from that presently budgeted for the existing processing facility.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Special plutonium recovery facilities, JB-Line, Savannah River, South Carolina

2. Project No. 82-D-201

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3. Date A-E Work Initiated: 1st Qtr. FY 1983

3a. Date Physical Construction Starts: 2nd Qtr. FY 1984

4. Date Construction Ends: 1st Qtr. FY 1987 [a]

5. Previous Cost Estimate: $66,000
Less amount for PE&D: 2,000
Net Cost Estimate: $64,000
Date: 3/82

6. Current Cost Estimate: $67,800 [a]
Less amount for PE&D: 2,000
Net Cost Estimate: $65,800
Date: 5/82

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 2,000	$ 0	$ 0	$ 0
1983	9,000 [b]	11,000	11,000	8,200
1984	26,000	26,000	26,000	21,800
1985	28,800	28,800	28,800	24,600
1986	0	0	0	9,400
1987	0	0	0	1,800

8. Brief Physical Description of Project

This project will provide a new plutonium recovery facility to preprocess and dissolve scrap and blend material. The facility will be constructed on top of the F-Area Separations Facility Building adjoining the existing JB-Line. The first story will be 193,000 cubic feet in size and will be designed to be earthquake and tornado resistant. New equipment will be installed in this facility to size reduce, oxidize and dissolve recoverable solids and to filter and purify the resultant solution prior to recycling to production streams. Equipment to assay, clean, and package waste will also be provided. Necessary auxiliary equipment for room and glove box ventilation, air sampling, fire detection

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[a] $1,800,000 TEC and 6-month schedule extension resulting from FY 1983 funding reduction.
[b] Based on Public Law, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities, JB-Line, Savannah River, South Carolina

2. Project No: 82-D-201

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8. Brief Physical Description of Project (cont'd)

and suppression, process vacuum, emergency electrical power, nuclear incident monitoring, and other similar functions is included. A 210,000 cubic foot, frame and siding second story will house change facilities, lunchroom, offices, and an elevator for operations personnel. FY 1984 funding will be used to complete design and initiate construction.

The existing air filter system does not have adequate capacity to handle the exhaust from the new recovery facility, therefore, a new filter system will be constructed to allow removal of part of the existing load. The new system will be sized for 40,000 cfm of flow and will consist of an 85 ft. wide by 100 ft. long by 20 ft. high sand filter, fan house, exhausters, and a 200 ft. high stack. The sand filter will be located north of Building 235-F.

9. Purpose, Justification of Need for, and Scope of Project

The existing special recovery facility was originally installed as a temporary expedient to process a limited quantity of scrap. It was not designed for either the long term use that has occurred nor the higher radiation level materials that have had to be processed. Control of contamination, radiation, and maintenance scheduling requires every increasing supervisory effort to assure safe operation. High radiation levels together with shielding that is inadequate to meet present standards, limits the time personnel can perform operational and maintenance functions. Employees must therefore be rotated to other assignments to maintain their exposures to below the guide limits. The new facilities will allow personnel exposures to be maintained at less than 1 rem/yr.

Additional capacity will be provided in the new facility by the installation of blending capability, in which high purity plutonium is blended with non-weapons grade plutonium to yield weapons grade material. The weapons grade plutonium will be converted to metal and used to meet defense program requirements. Capacity will also be provided to process Pu-239 scrap to make the plutonium available to meet defense requirements. Facilities to size reduce and oxidize scrap are not available in the existing facility, and as a consequence, certain forms of scrap cannot be processed. Increased capability to handle scrap is required.

When the existing recovery facilities were installed, they were connected to JB-Line service systems, such as solution transfer vacuum, vessel vent vacuum, cabinet ventilation, etc. These systems were designed to support the mainline process and no significant capacity modifications were made. These systems can neither adequately nor reliably support the present operations.

Equipment for cleaning process generated waste such as filters, rags, gloves, tools, etc., does not exist in the present facility. As a result, significant quantities of plutonium must be sent to retrievable storage. Since Federal policy is to reduce the amount of transuranic contaminated waste generated for storage, waste handling facilities are required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities,
JB-Line, Savannah River, South Carolina

2. Project No: 82-D-201

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10. Details of Cost Estimate:[a]

		Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 33 percent of construction costs, Item b			$14,880[b]
b. Construction costs			46,029
(1) Improvements to land		$ 0	
(2) Buildings - 221F		14,462	
(a) Process and support structure	$ 9,257		
(b) Sand filters	5,205		
(3) Special facilities		27,927	
(a) Ventilation system	4,656		
(b) Process equipment	18,342		
(c) Fire detection system	770		
(d) Electrical control rooms	4,159		
(4) Utilities		3,640	
(a) Safeguards	285		
(b) Communications system	130		
(c) Electrical power	2,015		
(d) Water and sewer systems	1,210		
c. Removal Costs Less Salvage			159
Subtotal			61,068
d. Contingency at approximately 11 percent of above costs			6,732
Total Estimated Cost			$67,800

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a/ Based on complete conceptual design and preliminary engineering.

b/ Includes $2,000,000 in Plant Engineering and Design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities, JB-Line, Savannah River, South Carolina

2. Project No: 82-D-201

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11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total Project Funding							
1) Total Facility Costs							
a) Construction Line Item	$ 0	$ 8,200	$21,800	$24,600	$ 9,400	$ 1,800	$65,800
b) PE&D	2,000	0	0	0	0	0	2,000
c) Expense Funded Equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 2,000	$ 8,200	$21,800	$24,600	$ 9,400	$ 1,800	$67,800
2) Other Project Funding							
a) R&D	$ 2,400	$ 0	$ 0	$ 0	$ 0	$ 0	$ 2,400
b) Other Project Related Costs	300	186	320	320	186	0	1,312
Total Other Project Funding	2,700	186	320	320	186	0	3,712
Total Project Funding	$ 4,700	$ 8,386	$22,120	$24,920	$ 9,586	$ 1,800	$71,512

b. Total Related Funding Requirements (Estimated life of project: 20 years)

1) Facility Operating Costs	$1,900
2) Programmatic Operating Expenses Directly Related to the Facility	1,950
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	50
4) GPP or Other Construction Related to the Programmatic Effort in the Facility	50
5) Other Costs	0
Total Other Related Annual Funding Requirements	$3,950

CONSTRUCTION PROJECT DATA SHEET

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1. Title and location of project: Special plutonium recovery facilities, JB-Line, Savannah River, South Carolina
2. Project No: 82-D-201

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding
   1) Total Facility Costs
      a) Construction Line Item - No narrative required.
      b) PE&D - Provided in FY 1982.
      c) Expense Funded Equipment - None required.
      d) Inventories - None required.

   2) Other Project Funding
      a) R&D - Includes $350,000 R&D and $2,050,000 of conceptual design and engineering studies.
      b) Other Project Related Costs - Plant liaison.

b. Total Related Funding Requirements
   1) Facility Operating Costs - Includes costs of labor, material and utilities for 7 day week, 4 shift schedules.
   2) Programmatic Operating Expenses Directly Related to the Facility - Change or cost of operating overhead associated with the Special Recovery Facility.
   3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - Estimated cost to replace capital equipment such as pumps, tanks, agitators, etc.
   4) GPP or Other Construction Related to Programmatic Effort - Cost to update or improve items.
   5) Other Costs - None.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Remote analytical facility upgrade and expansion Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

3. Date A-E Work Initiated: 2nd Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: $28,500
Date: 12/81

6. Current cost estimate: $28,500
Less amount for PE&D: 0
Net cost estimate: $28,500
Date: 12/82

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$28,500	$ 5,000	$ 3,000[a]	$ 1,567
1982	0	11,000[b]	13,000[b]	2,859
1983	0	10,500[b]	10,500[b]	6,400
1984	0	2,000	2,000	7,400
1985	0	0	0	10,274

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[a] Reflects congressional deferral of $2,000,000 to FY 1982.

[b] $2,000,000 of FY 1982 Appropriation of $13,000,000 temporarily reprogrammed for Project 81-D-143, L Reactor Upgrade. Funds were returned in FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho
2. Project No. 81-D-131

8. Brief Physical Description of Project (cont'd)

The proposed Remote Analytical Facility Upgrade and Expansion (RAFUE) project will require:

(1) construction of a new hot cell facility known as the Remote Analytical Laboratory (RAL), and
(2) renovation of a portion of the existing process sampling system, including a new pneumatic sample transfer system.

The project will incorporate several essential capabilities:

(1) improved ability to analyze radioactive samples,
(2) remote preparation of high-level, radioactive wastes for disposition,
(3) receipt, via a pneumatic system, of high-level, radioactive process solutions for chemical analysis,
(4) rapid, automated chemical analyses for fuel processing control which cannot be performed within the existing Remote Analytical Facility, and
(5) remote sampling of certain high-level radioactive process streams.

The Remote Analytical Laboratory will have a gross area of approximately 7,650 square feet with approximately 80 percent of that area being the net usable square footage. The walls and roof of the Waste Handling and Analytical Cell (WHAC), within the RAL, will be made of reinforced concrete approximately three feet thick. Several leaded-glass windows will be provided to enable safe viewing of activities within the cell. Interior surfaces will be lined with stainless steel to facilitate decontamination operations. Ventilation air entering the cell will pass through a high-efficiency particulate (HEPA) filter. Air leaving the cell will pass through a prefilter and two HEPA filters prior to being exhausted to the environment.

The Waste Handling and Analytical Cell will incorporate standard nuclear fuel handling equipment such as: (1) master-slave manipulators for remote handling of waste and samples and for remote operation and repair of analytical equipment, (2) a remotely-operated, waste compaction and loadout system for radioactive waste, and (3) conventional laboratory facilities which are required to enable remote facility operations. The primary special facility to be incorpprated in the cell will be a pneumatic transfer system to receive samples from several locations within the operating areas.

A recent examination of the existing Remote Analytical Facility (RAF) revealed a contamination control concern which could become a severe problem in the near future. Although the RAFUE project scope included some minor improvements in the RAF's contamination control features, the recently-identified concern was of such a magnitude that it can not be resolved economically. Furthermore, it was concluded that the RAF could not remain in operation unless the recently-identified

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion Idaho Fuels Processing Facility, INEL, Idaho	2. Project No. 81-D-131

8. Brief Physical Description of Project (cont'd)

concern was addressed. Consequently, the RAF upgrade has been deleted from this project with the subsequent addition of the renovation of the existing process sampling system. The RAF will be placed in an inactive reserve status.

The renovation of the existing process sampling system will incorporate a shielded cave in the processing building and a pneumatic sample transfer system to the RAL. The cave will incorporate leaded-glass windows for viewing activities in the cave, master-slave manipulators for remote handling of samples, a stainless steel lining on interior surfaces to facilitate decontamination operations, and a HEPA-filtered ventilation system.

The utilities required will include: (1) low pressure steam; (2) hot treated water; (3) cold treated water; (4) demineralized water; (5) compressed air, (6) vacuum; (7) service drain, (8) electricity; (9) reagent lines; (10) decontamination solution; (11) raw water for the fire protection systems; and (12) a radioactive liquid waste drain.

Low level radioactive liquid waste from decontamination operations and other sources will be returned to the existing plant waste disposal system for concentration and storage.

9. Purpose, Justification of, Need for and Scope of Project

The primary justification for this project is to reduce the radiation exposure received by IFPF personnel and to properly support Fluorinel fuel processing operations.

The Remote Analytical Laboratory must become operational prior to the third quarter of FY 1985 so that chemical analyses needed for the optimal operation of the Fluorinel process can be provided. The cell is also required by the third quarter of FY 1985 so that a substantial quantity of high-level (i.e., 120 Rem/hour at contact) radioactive waste resulting from chemical analyses can be remotely prepared for disposition.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

9. Purpose, Justification of, Need for and Scope of Project (cont'd)

Making alterations to the existing Remote Analytical Facility does not represent a viable alternative to the construction of the RAL because several problems exist: (1) RAF crew members currently receive as much as 15 man-rems of penetrating radiation per year as a result of the semi-remote means they employ for the load-out and packaging of waste which ranges up to 25 Rems of gamma and beta radiation per hour at a distance of 12 inches; (2) the existing RAF is not designed to analyze high-level samples such as these while providing adequate shielding of the analytical personnel; and (3) it is estimated that without the modifications provided by this project, the total radiation exposure to support facility operations will be approximately 180 man rem per year. This exposure would be reduced to approximately 7.5 man rem per year with the facility modifications provided by this project.

The modifications to an existing process sampler are required due to the anticipated increase in sample radioactivity in FY 1985. The existing sampling system will not provide adequate shielding and containment during sampling and sample transfer operations.

If funding for this project should be deferred or not authorized, analytical personnel at the IFPF will incur increases in radiation exposure which substantially exceed the levels allowed by the ALARA radiation exposure control guidelines. Furthermore, a funding deferral at this time would result in not being able to adequately support Fluorinel fuel processing operations.

The estimated gross annual cost (excluding depreciation) for operating the RAL upon completion assumes four rotating shifts to provide seven days per week and 24 hours per day coverage. The estimate also assumes that six additional persons will be present on the day shift to handle maintenance and waste loadout.

Based on the proposed FY 1983 cost per square foot to operate IFPF facilities, the gross annual cost (utilities, maintenance, and janitorial services) for operating the RAL will be approximately $60,000. The annual cost of programs to be carried out in the facility will be $2,470,000 and the annual incremental program cost will be $1,560,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

9. Purpose, Justification of, Need for and Scope of Project (cont'd)

	Operating Costs 1st Year of Operating	Incremental Operating Cost 1st Year of Operation
(a) Employment		
(1) Personnel to support the RAL	38	24
(b) Operating Costs		
(1) Materials and Supplies	$ 130	$ 80
(2) Utilities, Maintenance and Janitorial Services	60	40
(3) Personnel Costs (Including Fringe Benefits)	2,280	1,440
Total Costs	$2,470	$1,560

10. Details of Cost Estimate[a]

	Item Cost	Total Cost
a. Engineering, Design and Inspection Costs at approximately 32% of construction costs, item c		$ 4,950
b. Design Liaison and Health and Safety at approximately 8% of construction costs		1,300
c. Construction Costs		15,580
(1) Improvements to Land	$ 160	
(2) Buildings		
(a) Remote Analytical Laboratory, 7650 sq. ft. @ $1495/sq. ft.	11,440	
(b) Sampler Upgrade	730	
(3) Special Facilities		
(a) Waste Handling and Analytical Cell Equipment	2,260	
(b) Sampler Upgrade Equipment	10	
(c) Pneumatic Transfer Systems	980	
d. Standard Equipment		500
e. Removal Cost Less Salvage		50
Subtotal		22,380
f. Contingency at approximately 27% of above costs		6,120
Total		$28,500

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[a] These estimates are based on a completed RAL Title II (definitive) design and a Remote Sampling and Transfer System conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished to the greatest extent possible by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	Total
A. Total Project Funding				
1. Total Facility Costs				
a. Construction Line Item	$10,826	$ 7,400	$10,274	$28,500
b. PE&D	0	0	0	0
c. Expense Funded Equipment	0	0	0	0
d. Inventories	0	0	0	0
Total Facility Costs	$10,826	$ 7,400	$10,274	$28,500
B. Other Project Funding				
a. R&D necessary to complete construction	596	0	0	596
b. Other project related costs	1,379	1,425	1,300	4,104
Total Other Project Funding	1,975	1,425	1,300	4,700
Total Project Funding (Item 1 and Item 2)	$12,801	$ 8,825	$11,574	$33,200

b. Total Related Funding Requirement (Estimate Life of Project: 20 years)

1. Facility Operating Costs	$ 190
2. Programmatic Operating Expense Directly Related to the Facility	2,280
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	100
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$ 2,570

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Defense Waste and Byproducts Management (DP)				
Operating Expenses:				
Interim Waste Operations a/	$ 175,810	$ 200,968	$ 200,968	$ 221,026
Long-Term Waste Management Technology b/	67,667	54,961	54,961	64,604
Terminal Storage	3,700	14,000	14,000	20,800
Program Direction	1,851 c/	2,000	2,000	2,470
Total Operating Expenses.	$ 249,028	$ 271,929	$ 271,929	$ 308,900
Capital Equipment	$ 20,833	$ 31,605	$ 31,605	$ 33,900
Construction	$ 104,032	$ 215,195 d/	$ 215,195 d/	$ 268,700
Total Defense Waste and Byproducts Management	$ 373,893	$ 518,729	$ 518,729	$ 611,500
Staffing FTP/Total FTE's e/ ...	176/185	156/164	156/164	141/149

Authorization: Section 1, Public Law 83-703

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a/ Includes funding for Decontamination and Decommissioning which was shown separately in the FY 1983 budget.

b/ Includes funding for Transportation Research and Development which was shown separately in the FY 1983 budget.

c/ Includes $274,000 reprogrammed from Interim Waste Operations.

d/ Includes $50,000,000 of Waste Isolation Pilot Plant project funds proposed for deferral until FY 1984.

e/ Includes FTP/FTE's (FY 1982 = 142/148, FY 1983 = 120/124, FY 1984 = 104/108) transferred from the Nuclear Energy Breeder Program at Idaho.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Defense Waste and Byproducts Management
(In Thousands of Dollars)

FY 1983 appropriation	$ 518,729
Built in increases and decreases	0
FY 1984 base	$ 518,729
Program Increases and Decreases:	
Escalation increase for operating, equipment, and general plant project funds	+22,625
Continue surveillance and maintenance of surplus radioactively contaminated DOE facilities originally used in support of defense programs, and continuation of disposition projects initiated in FY 1983 and previous years	-3,041
Continue operations at the Idaho National Engineering Laboratory (INEL), the Oak Ridge National Laboratory (ORNL) and other sites, and operational support for the Transportation Operations and Traffic Management program at all sites	+1,367
Continue operations at Hanford Reservation with increased support for PUREX operations and encapsulation of the backlog of cesium and strontium stored at B-Plant	+8,948
Continue operations at Savannah River with decreased funding due to completion of new process demonstrations and stretch out of activities associated with the waste transfer program which was rephased to support the Defense Waste Processing Facility (DWPF)	-5,720
Continue operating support for basic landlord requirements at Hanford and INEL and restoration efforts at Hanford	+4,434
Provide critical programmatic equipment at all sites and critical landlord equipment to offset severe equipment deterioration and obsolescence at Hanford and INEL	+2,366
Provide critical general plant projects to support programmatic activities at Los Alamos National Laboratory (LANL), Hanford, INEL, ORNL, and Savannah River, and to support landlord activities at Hanford and INEL	+4,656
Complete funding for Hanford rail replacement project which provides vital safety-related upgrading of Hanford railroad system	-3,000
Complete funding for Radioactive Waste Facilities Improvements project at ORNL	-1,000
Delay Waste Handling and Isolation Facilities project at Hanford consistent with stabilization and isolation of old single shell tanks.	-3,430
Continue construction of new double shell waste tanks at Hanford for storage of waste from the restart of PUREX, waste from other nuclear operations, and waste transferred from old tanks	+12,000

Summary of Changes - continued

Complete funding for waste transfer lines in support of PUREX operation at Hanford	$ -2,750
Phaseout airborne waste filter development and filter test facilities support tasks	-624
Continue evaluation of long-term management options for high-level waste at Richland and Idaho	+1,053
Begin construction of the Defense Waste Processing Facility (DWPF) at Savannah River to immobilize high-level waste for disposal, leading to completion and "hot" operation in 1989	+108,215
Continue low-level waste technology activities with decreased funding due to completion of prior year efforts	-450
Decrease Transuranic-contaminated (TRU) waste greater confinement disposal technology R&D efforts and other activities	-60
Continue planned activities for TRU pilot processing facilities	-949
Completion of efforts to develop beneficial uses for defense byproducts with future efforts funded by users	-7,462
Continue transportation research and development with increased funding for development of transuranic waste transportation systems	+985
Continue the Waste Isolation Pilot Plant (WIPP) project consistent with the delayed receipt of Administrative Land Withdrawal authority in late 1983. Funding availability in FY 1984 actually increases over FY 1983 because of proposed deferral	-45,722
Provide funding for 41 full-time equivalent personnel at Headquarters.	+330
FY 1984 budget request	$ 611,500

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Defense Waste and Byproducts Management

The goal of the Defense Waste and Byproducts Management program is to provide for safe interim storage or utilization of nuclear wastes and byproducts generated primarily from nuclear materials production and naval propulsion. In addition, the program also supports the development of technologies and facilities for the final disposal of defense nuclear waste.

The program has three primary elements: Interim Waste Operations, Long-Term Waste Management Technology, and Terminal Storage. These elements provide primarily for the handling and disposal of low-level and airborne radioactive waste, the storage of transuranic and high-level waste, development of technology for the long-term management of waste, and the demonstration of the safe disposal of defense wastes.

Fiscal year 1984 efforts will continue the upgrade of waste handling, storage, and disposal operations by transferring high-level waste from old single-shell tanks at Savannah River and Hanford into new double-shell tanks, construction of new facilities, improvement of facilities, and upgrading of burial ground operations. The long-term program in FY 1984 will focus on the construction of the Defense Waste Processing Facility (DWPF) at Savannah River, and preparation of transuranic waste at Idaho and other DOE sites for planned shipment to the Waste Isolation Pilot Plant (WIPP).

The Defense Waste Processing Facility (DWPF) at Savannah River will provide the final step in processing high-level waste for disposal. Facility construction will begin in FY 1984 leading to "hot" operations in FY 1989. The DWPF will immobilize the high-level waste (HLW) in borosilicate glass for storage, transportation to, and disposal in a geologic repository. Immobilization and confinement in a repository will ensure the long-term isolation of these wastes from the environment with minimal maintenance and surveillance.

The Waste Isolation Pilot Plant, located near Carlsbad, New Mexico, is intended to demonstrate the safe disposal of defense nuclear waste. The WIPP facilities will be capable of routine operations to receive, inspect, package, and emplace defense nuclear waste in a geologic disposal environment. This research and development facility will be sized to handle quantities typical of defense nuclear waste inventories and anticipated generation rates. Emplacement of radioactive waste in WIPP could begin in 1989.

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses	$ 271,929	$ 308,900
Interim Waste Operations	$ 200,968	$ 221,026

The objective of the interim waste operations program is to provide safe processing and utilization, storage or disposal of DOE radioactive waste and byproducts. Waste management support is necessary for material production, and naval reactor activities. The program includes the operation and maintenance of high-level waste (HLW) storage tanks, bins, and related processing and storage facilities at Savannah River, Richland, and Idaho; the operation and maintenance of low-level waste (LLW) burial grounds at Savannah River, Oak Ridge National Laboratory, Idaho National Engineering Laboratory, Hanford Reservation, Los Alamos National Laboratory (LANL), Sandia National Laboratory (SNLA), and Nevada Test Site (NTS); the retrievable storage of transuranic (TRU) waste at various sites; the operation of low-level and intermediate-level liquid waste facilities; the operation of three filter testing facilities; and the processing of low-level gaseous waste streams. Efforts are also underway to transfer HLW from old tanks at Savannah River and Hanford into new double shell tanks, to construct new and improved facilities, to improve burial ground

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
   Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding
   1. Total Facility Costs
      (a) Construction Line Item - No narrative required.
      (b) PE&D - No narrative required.
      (c) Expense Funded Equipment - No narrative required.
      (d) Inventories - No narrative required.
   2. Other Project Funding
      (a) R&D necessary to complete construction - Approximately $536,000 has been spent on conceptual design.
      (b) Other Project-Related Costs - Approximately $4,104,000 will be spent for project support during design and construction and for testing and startup of the completed facility.

b. Total Related Funding Requirement

It is estimated that the facilities will be used 20 years for their programmatic purpose.

1. Facility Operating Costs - There are no major elements. The elements are materials and supplies, utilities, maintenance and janitorial services.
2. Programmatic Operating Expenses directly related to the Facility - The majority of the programs (i.e., approximately 95%) to be carried out in the facility are in support of Nuclear Materials Production and Defense Waste Management. Approximately 5% of the programs are for other INEL contractors, although the exact percentage varies greatly from year to year.
3. Capital Equipment not related to construction but related to the Programmatic Effort in the Facility - An estimated $100,000 annually is required for capital equipment to maintain the facility.
4. GPP or Other Construction related to Programmatic Effort - No narrative required.
5. Other Costs - No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 3rd Qtr. FY 1983

4. Date Construction Ends: 2nd Qtr. FY 1985

5. Previous Cost Estimate: $18,400
Date: 2/82

6. Current Cost Estimate: $18,400
Date: 12/82

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$ 7,000	$ 0	$ 0	$ 0
1982	1,000	5,500	5,500	326
1983	3,000	5,500	5,500	6,000
1984	7,400	7,400	7,400	6,000
1985	0	0	0	6,074

8. Brief Physical Description of Project

This project provides for the construction of an approximately 8 mile long steam transfer header from the 400 D Heavy Water Area to the 200F Separations Area. At the F Area the new header will connect to the local steam distribution system and an existing steam transfer header between the 100C Reactor Area and the 200F and H Separations Areas.

The new D to F header will be of a size suitable to convey up to 500,000 pounds per hour of steam. It will be run for most of its length on sleepers on the ground adjacent to an existing right of way for a secondary road. Necessary valving and controls will be installed at the 400 D Area, F Area and the intersection with the existing C-F-H steam transfer header to control rate of transfer and to close off the line in the event of a major pipe rupture. A tap for future loads will be installed adjacent to the interconnection to the existing C-F-H line. FY 1984 funds will be used to complete construction activities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

9. Purpose, Justification of Need for, and Scope of Project

The steam transfer header proposed by this project will provide additional steam needed in the F and H chemical separations area, to support increased separations throughput that will result from planned changes in production operations including the production of 3% Pu-240 plutonium for blending with fuel-grade plutonium, and restart of L Reactor.

Presently, four boilers in the F chemical separations area and three boilers in the H chemical separations area provide steam for chemical processing, waste management, and supporting services. Each boiler is coal-fired and rated at 60,000 pounds per hour. At present production rates, all steam generating units in the area are required to meet the higher demands that occur during several months of winter with little or no excess steam available. Routine boiler inspections and overhauls are scheduled during the off-peak period without affecting production. However, forced outages attributed to equipment obsolescence, and reductions in steam capacity due to adverse coal conditions, both of which curtail production, are becoming more frequent. New waste removal programs and production activities will significantly increase the peak steam demand. With these known load additions, present available boiler capacity will be exceeded with serious interference to production, waste removal, and waste management operations.

The new D to F Area steam transfer header provides the most cost effective means available to meet steam requirements. It will allow transfer of both the new and existing steam loads to the more economical D Area co-generation boilers. This will result in manpower, maintenance, and fuel savings.

10. Details of Cost Estimate[a]

	Item Cost	Total Cost
a. Engineering design and inspection at approximately 12% of construction costs, Item b		$ 1,745
b. Construction costs		14,430
1) Improvements to land	$ 790	
2) Buildings		
1 prefab, approximately 2,000 sq. ft.	460	
3) Special facilities	840	
4) Utilities	12,340	
c. Removal costs		60
Subtotal (Items a, b, and c)		16,235
d. Contingencies at approximately 13% of above costs		2,165
Total Estimated Cost		$ 18,400

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[a] Based on completed conceptual design and preliminary engineering.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam transfer header,
Savannah River, South Carolina

2. Project No. 81-D-142

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11. **Method of Performance**

Design and construction will be accomplished by the operating contractor, utilizing fixed price subcontracts awarded on the basis of competitive bidding to the extent possible.

12. **Funding Schedule of Project Funding and Other Related Funding Requirements**

	Prior Years	1982	1983	1984	1985	Total
A. Total project funding						
1) Total facility costs						
(a) Construction line item	$ 0	$ 326	$6,000	$6,000	$6,074	$18,400
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0		0
Total Facility Costs	$ 0	$ 326	$6,000	$6,000	$6,074	$18,400
2) Other project funding						
(a) Conceptual design and engineering studies	$ 120	$ 0	$ 0	$ 0	$ 0	$ 120
(b) Other project related costs	10	40	80	20	0	150
Total other project funding	$ 130	$ 40	$ 80	$ 20	0	$ 270
Total project funding	$ 130	$ 366	$6,080	$6,020	$6,074	$18,670

B. Total related annual funding requirements (estimated life of project is 40 years)

1) Facility operating costs (annual saving)	$ (3,500)
2) Programmatic operating expenses directly related to the facility	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility	25
4) GPP or other construction related to the programmatic effort in the facility	50
5) Other costs	0
Total other related annual funding requirements	$ (3,425)

CONSTRUCTION PROJECT DATA SHEET

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1. Title and location of project: Steam transfer header,
Savannah River, South Carolina

2. Project No. 81-D-142

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
   1) Total Facility Costs
      (a) Construction Line Item - No narrative required.
      (b) PE&D - None
      (c) Expense Funded Equipment - None
      (d) Inventories - None

   2) Other Project Funding
      (a) Conceptual design and engineering studies - $50,000 for conceptual design and $70,000 for engineering studies.
      (b) Other project related costs - The $150,000 is the estimated cost of plant liaison during conceptual and final design, construction and startup.

B. Total Related Funding Requirements
   1) Facility Operating Costs - The $3,500,000 reduced annual operating cost includes a $3,700,000 reduction resulting from the shutdown of C, F, and H Area (partial) powerhouses, and a $200,000 increase in fuel cost resulting from the heat loss in the steam header.
   2) Programmatic Operating Expense Directly Relating to the Facility - None
   3) Capital Equipment Not Related to Construction, but Related to Programmatic Effort in the Facility - The $25,000 estimated annual cost for capital equipment is for replacements and improvements to maintain and upgrade the operation of the facilities.
   4) GPP or other Construction Related to Programmatic Effort - The $50,000 estimated annual cost for GPP and other capital facilities is for improvements necessary for the safety and operability of the facilities.
   5) Other Costs - None

operations, and to stabilize old burial ground areas to minimize the potential for radionuclide release to the environment. In addition, this program provides for the safe management and disposition of surplus radioactively contaminated DOE facilities that were used in support of defense programs.

Operations to process and store or dispose of radioactive waste from DOE defense and R&D programs, including necessary maintenance of facilities and environmental monitoring, must continue in order to assure the safe and environmentally acceptable conduct of DOE's mission. In addition, restoration is necessary to improve safety, minimize releases of radioactivity to the environment, and for cost-effective "landlord" operations at the Hanford Reservation and the Idaho National Engineering Laboratory.

The Interim Waste Operations program will also develop procedures for the certification of newly generated TRU wastes for acceptance at the Waste Isolation Pilot Plant (WIPP). Starting in FY 1984, newly generated TRU waste will be certified for WIPP and stored separately from the backlog of stored waste. The program also supports the evaluation of regulatory, legislative and carrier-related issues that impact the safe, secure and efficient transportation of nuclear materials.

	FY 1983 Appropriation	FY 1984 Request
a. Idaho National Engineering Laboratory (INEL), Idaho	$ 30,100	$ 34,460

The requested funds are for operation of the waste tank farm and the New Waste Calcining Facility (NWCF) at INEL. The NWCF converts liquid high-level radioactive waste from the Idaho Chemical Processing Plant (ICPP) to a granular solid suitable for interim storage in underground bins. In addition, the new coal fired steam generating plant requires support for operating personnel. The funding supports the operation of the INEL Radioactive Waste Management Complex (RWMC) for the receipt, handling, and routine disposal of low-level solid radioactive waste, and for the segregation and retrievable storage of transuranic-contaminated solid waste. An extensive program of rock fracturing and excavation to extend the lifetime of the burial ground facilities is also in progress.

Supporting activities include process development and conceptual engineering and design studies related to waste handling and treatment; the development and implementation of methods to assure that newly generated TRU waste is certified as meeting the waste acceptance criteria for the WIPP facility; the development and demonstration of retrieval and transfer techniques required to certify previously stored TRU waste; and the operation of a segregated storage area for certified waste.

The increase is required to support rock fracturing and excavation activities at the RWMC; to operate the NWCF to reduce the backlog of liquid HLW generated since the old facility was shut down; and to provide engineering and general support.

b. Oak Ridge National Laboratory (ORNL), Tennessee	$ 13,600	$ 14,251

The requested funds provide for operation of the radioactive waste management facilities at ORNL, Oak Ridge, Tennessee, including the low- and intermediate-level liquid waste handling system; the laboratory ventilation system for gaseous radioactive waste; the burial grounds for the receipt, handling, and routine disposal of low-level solid waste; a storage facility for transuranic-contaminated solid waste; and the hydrofracture facility for the disposal of intermediate-level waste through injection of a cement grout into the shale formation underlying ORNL. Also included are supporting activities such as process development, engineering studies, and conceptual design related to waste handling at ORNL.

This level supports the siting, characterization, and design of a Central Waste Disposal Facility for the burial of all the low-level radioactive waste that is generated at the Oak Ridge complex.

	FY 1983 Appropriation	FY 1984 Request
c. Hanford Reservation, Washington	$ 78,610	$ 93,061

The requested funding is required for maintenance and operation of radioactive waste management facilities at the Hanford Reservation. The principal waste management activities include the stabilization and isolation of all 149 old single shell tanks; the surveillance and maintenance of waste storage tanks (including 20 new double shell tanks); operation of waste handling, concentration and fractionation facilities; solidification and encapsulation of cesium and strontium removed from high-level waste; and operation of solid waste burial grounds for the receipt, handling and disposal of low-level solid waste; and for the segregation and retrievable storage of TRU-contaminated solid waste. Also included are support activities such as process development, engineering studies, and conceptual design for improved waste handling practices and facilities; for surveillance of waste management facilities which are no longer in use; and for the cleanup and control of contaminated areas. Site common use inventories and process spares are provided by this program.

The requested funding continues the stabilization and isolation of waste and in single shell tanks on a revised schedule. In this effort, liquid high-level waste is transferred to new double shell tanks and drainable interstitial liquid waste is removed from the crystalline salt cake and sludge in the single shell tanks. Piping and other connections to the old tanks are sealed pending the implementation of the long-term waste management program. The deactivation of all 149 old single shell tanks was completed in November 1980. Stabilization and isolation of waste in single shell tanks will be completed by the end of FY 1989 (one year later than indicated in the FY 1983 Congressional budget). Also supported are the cleanup and stabilization of 50 acres of outdoor surface-contaminated areas; and process development and engineering studies peculiar to the Hanford site which include the immobilization of high-level waste and in-place stabilization of buried transuranic waste.

The increase supports the waste management activities for the startup of the PUREX fuel reprocessing plant in FY 1984 and more effective operations to purify, solidify, and encapsulate the backlog of cesium and strontium in B-Plant. The cesium and the strontium backlogs will have been encapsulated by FY 1983 and FY 1986, respectively.

d. Savannah River Plant, South Carolina	$ 56,050	$ 54,254

The requested funding is required to operate radioactive waste management facilities at the Savannah River Plant (SRP). The principal activities include: processing and storage of HLW, surveillance and maintenance of waste tanks and supporting facilities, waste concentration to reduce volume and mobility, and transfer of waste from old tanks to new double shell tanks; low-level liquid effluents management; operation of SRP burial grounds for the receipt, handling and disposal of low-level solid waste and the retrievable storage of transuranic solid waste; and support for solid waste volume reduction efforts. Also included are support activities such as process development; engineering studies; conceptual design for improved waste handling practices, equipment and facilities; and construction liaison.

This funding will permit the continued transfer of waste from old single shell tanks to new double shell tanks which were completed in FY 1982. The waste transfer program was delayed in order to interface more efficiently with the DWPF and will be completed in 1994 (three years later than the date indicated in the FY 1983 Congressional budget). This program includes the design and construction of sludge process tanks, piping and instrumentation for transfer operations; tank inspections during and after transfer of the sludge; and process development work to support the integration of the waste transfer and immobilization programs. Also provided are evaluations of the in-tank precipitation demonstration and the design of a production scale process which will significantly reduce the costs of decontaminating the liquid fraction of the HLW, the development of procedures to certify newly generated TRU waste for the WIPP facility, and the development and demonstration of volume reduction techniques for LLW and TRU waste.

	FY 1983 Appropriation	FY 1984 Request
e. Other Sites and Transportation Operations	$ 5,800	$ 5,622

DOE also operates solid radioactive waste management facilities at the Nevada Test Site (NTS), the Los Alamos National Laboratory (LANL), and the Sandia National Laboratory (SNLA). The requested funding supports the receipt, processing, and disposal of low-level solid wastes at these sites and the segregation and retrievable storage of transuranic-contaminated solid waste at NTS and LANL; supporting environmental and other site-specific studies; and the development of procedures to certify that newly generated TRU waste meets the waste acceptance criteria for the WIPP.

The requested funding also supports the Department-wide transportation management function which includes legislative and regulatory analyses; representation at litigation and rate hearings; support of hazardous materials compliance training required for carriers; operation of the shipment mobility and accountability (SMAC) data system; support of the Transportation Review Group; and development of state, local, public and carrier acceptance with regard to nuclear shipments. The traffic management program will take actions in 1984 which will effect savings of approximately $10 million annually in shipping costs Department-wide. These actions include solicitation of special motor and rail carrier, Section 10721 (Interstate Commerce Commission Act) quotations, and centralized volume discount freight rate plan applicable to DOE facilities and contractor transports. Additionally, due to litigation/ negotiation efforts with the nation's rail carriers on radioactive spent fuel movements for the naval propulsion program, DOE can effect a substantial roll back of these rate levels at ICC.

f. Hanford Reservation, Landlord Support, Washington ..	$ 3,143	$ 7,500

The Hanford Landlord support program includes maintenance, repair, and replacement of general site support equipment and facilities at the Hanford Reservation such as utilities, roads, railroads, transportation and other heavy equipment and facilities. Operating funds are used for general purpose building and equipment maintenance, engineering, and procurement associated with equipment replacement.

At the Hanford Reservation, many of the general support facilities and systems and most of the equipment are old and severely deteriorated. Failures are frequent and downtime is excessive. An upgrade program was begun in FY 1981 to restore operational safety, efficiency, and reliability to Hanford general support facilities and equipment and to complement the base support program at the site. The increase supports completion of the upgrade program in FY 1988.

g. Idaho National Engineering Laboratory, Landlord Support	$ 1,010	$ 1,378

The requested funding provides support for non-programmatic conceptual design related to maintenance, repair, and replacement of general site support facilities such as utilities, roads, and service buildings. The increase includes funding to acquire the necessary common use stores inventory. There are 108 full-time equivalent (FTE) DOE personnel in FY 1984 at Idaho to support landlord program activities. These billets are included in the Defense Waste and Byproducts Management program, but are funded through program assessments at the Idaho site. The reduction of 29 personnel from FY 1983 reflects the decision to contract out the general security functions at the site.

	FY 1983 Appropriation	FY 1984 Request
h. Decontamination and Decommissioning	$ 12,655	$ 10,500

This program provides for the safe management and disposition of surplus radioactively contaminated DOE facilities originally used in support of defense programs. Approximately 400 defense facilities are now under this program including reactors, laboratories, reprocessing plants, and waste storage and disposal facilities. All facilities were originally used for defense-related purposes and most (345) are located at the Hanford Site (Washington). The program also includes surplus facilities at Oak Ridge National Laboratory (Tennessee), Idaho National Engineering Laboratory (Idaho), Mound Facility (Ohio), Knolls Atomic Power Laboratory--Knolls Site (New York), and the New Brunswick Laboratory Site (New Jersey). The Weldon Spring Site and the Niagara Falls Storage Site were transferred to the commercial waste management program during FY 1982.

Priorities for decontamination and decommissioning will stress the recovery of valuable materials, the beneficial reuse of facilities, and the avoidance of future maintenance costs while reducing potential health impacts.
The Richland Operations Office is lead field office for this program. The objectives are: (1) to provide surveillance and maintenance of surplus facilities to assure that they remain in an environmentally safe condition until decommissioning or stabilization actions can be undertaken; (2) to develop site-specific assessments of benefits and risks and long range plans for cost-effective reuse, maintenance, or decommissioning of the surplus facilities; and (3) to conduct selected projects to control or eliminate hazardous conditions, or to release facilities and equipment for reuse.

The requested funding supports the following work:

o Continue maintenance and surveillance at the Mound Facility, Idaho National Engineering Laboratory (INEL), Oak Ridge National Laboratory (ORNL), and the Hanford 100 and 200 Areas (including roof and ventilation system repairs) to ensure that the surplus facilities at these sites remain safe.

o Continue planning and complete risk assessments at four defense sites (INEL, ORNL, and the Hanford 100 and 200 Areas) resulting in: (1) physical and radiological characterization of surplus facilities; (2) identification of facilities and equipment that can be decontaminated and reused; (3) development of Site Surveillance and Maintenance Plans; and (4) development of Long Range Decommissioning Plans for each site.

o Continue ongoing decommissioning projects: New Brunswick Laboratory (completion of Phase II Decommissioning), the Metal Recovery Facility at ORNL; Special Metallurgical Building at the Mound Facility, and the 201-C Strontium Semiworks and 100-F Production Reactor at Hanford.

Long-Term Waste Management Technology	$ 54,961	$ 64,604

The Long-Term Waste Management Technology program is directed toward the long-term management of DOE radioactive wastes including an integrated transport system. The program consists of developing alternative technologies for each waste type and assessing the associated hazards, costs, and environmental impacts in order to select and implement long-term disposition alternatives. In response to the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1982 (P.L. 97-90), a plan is being prepared by June 30, 1983, for transmittal by the President to the Congress which reflects the plans for permanent disposal of high-level and transuranic wastes from atomic energy defense activities. In FY 1984, the program will continue to focus on immobilization of high-level waste (HLW) at Savannah River and on the preparation for shipment to WIPP of transuranic (TRU) wastes from Idaho and other sites. Included is technology and process development for the Defense Waste Processing Facility (DWPF) at Savannah River and the TRU pilot facilities at Idaho.

The Defense Waste Processing Facility (DWPF) at Savannah River will process high-level waste for disposal. Construction will begin in FY 1984 and "hot" operations in FY 1989. The DWPF will immobilize the HLW for storage, transportation to, and disposal in a repository. The TRU waste efforts will provide technology for the certification of TRU wastes, processes for their further treatment and TRU transportation systems to support WIPP operations. Immobilization of HLW and processing of TRU wastes will provide a high degree of isolation from the environment and minimize the need for future maintenance and surveillance.

The low-level waste (LLW) and airborne waste (ABW) technology programs support waste operations at DOE sites. The byproducts utilization program encourages use of defense byproducts for military lighting, processing food, and purification of sewage sludge. Future efforts will be funded by users.

	FY 1983 Appropriation	FY 1984 Request
a. High-level waste technology	$ 26,720	$ 36,129

The objective of this program is the long-term disposition of high level waste at Savannah River, Hanford, and Idaho. Emphasis in FY 1984 will continue on Savannah River. Long-term programs at the other two sites will be deferred until the Savannah River program is well underway.

Savannah River - Technology development directly supports the design and construction of the Defense Waste Processing Facility (DWPF) which will immobilize high-level waste for disposal in a geologic repository. Process development, engineering studies, and equipment development will support an optimized design for the DWPF. Standard test methods will be established and approved for characterizing the DWPF waste form and canister in order to evaluate these properties against established repository criteria and standards. Also provided are DWPF plant liaison, design reviews, development of equipment specifications and criteria, and engineering trade-off studies that support an FY 1984 construction start.

Hanford and Idaho - Planning and evaluation for long-term programs will be continued during FY 1984.

b. TRU waste technology	$ 6,730	$ 6,755

Technology for preparation of TRU waste for emplacement in WIPP will be developed including demonstration of waste transport vehicle performance; development and checkout of instrumentation to accurately measure radionuclide content; design and implementation of a WIPP acceptable canister to remotely handle TRU waste; demonstration of an aqueous waste stream treatment; and evaluation of disposal methods for special wastes.

c. TRU processing facilities	$ 7,905	$ 8,430

The objectives of the Processing Experimental Pilot Plant (PREPP) and the Stored Waste Examination Pilot Plant (SWEPP) are to develop processes, through experimentation, which can treat the INEL stored TRU waste to meet the WIPP acceptance criteria at a lesser cost than originally envisioned by the Transuranic Waste Treatment Facility. The SWEPP experiments will evaluate non-destructive examination and assay techniques to certify those stored containers of TRU waste for the WIPP that do not need treatment in the PREPP. The PREPP experiments will examine processes to treat the uncertifiable TRU waste from the SWEPP to meet the WIPP acceptance criteria. The initial experiments will focus on shredding, incinerating (rotary kiln), and cementing. A melter will be incorporated in future tests.

d. Low-level waste technology	$ 5,621	$ 6,000

The objectives are to: (1) improve techniques for shallow land burial (SLB) including monitoring and corrective measures for low-level solid wastes; (2) provide criteria for disposal by SLB; (3) develop treatment processes to reduce volumes of waste generated for improved handling; and (4) evaluate alternative disposal concepts for application to DOE site support.

The low-level waste program to improve SLB technology was begun in FY 1977 and now includes waste treatment and alternative disposal techniques. In FY 1982, criteria were drafted for inclusion in a DOE Order for waste management operations at DOE sites. In FY 1983, a low-level waste classification system based on hazard to man will be developed to facilitate treatment, handling, and disposal. Fiscal year 1984 funding will provide for field testing of SLB improvements and limited development of corrective measures, monitoring, and waste treatment processes.

	FY 1983 Appropriation	FY 1984 Request
e. Airborne waste technology	$ 1,235	$ 835

The objective of this program is to develop technology for the containment and immobilization of gaseous effluents at DOE facilities. Efforts include: (1) particulate filtration development to increase service life of filters used in DOE facilities by using improved materials and pre-filter concepts; and (2) off-gas monitoring technology to assure efficient removal of radionuclides from effluents. The FY 1984 funding will allow for continuing closeout of the filter development and Filter Test Facilities support.

f. Byproduct utilization	$ 1,650	$ 0

The objective of the byproduct utilization program is to identify and develop safe and cost-effective applications of radioisotopes and materials from the Defense fuel cycle. DOE funded projects will be continued with funding from prior years. Specifically, the funds for completion of the Albuquerque irradiator project will be provided to the City of Albuquerque. DOE commitments to provide continuing assistance to the City of Albuquerque will be reassessed. Construction of the transportable irradiator will be completed. Research using the Sandia irradiator and studies involving New Mexico State University will be completed and final reports issued. Strategic noble metal recovery will be continued as part of the DWPF project without additional cost. Isotopic power generation and the development of self-powered lighting will be funded by users. The first production unit of a shipping cask for economically transporting cesium and strontium capsules from storage at Hanford will be completed. Reports on the pork and fruit irradiation will be completed. Future efforts in this program will be funded by users.

g. Transportation Research and Development	$ 5,100	$ 6,455

The nuclear materials transportation program is responsible for the planning, design, development, and testing of integrated transport systems to meet the Department's nuclear material transport requirements. Transport system, package, and materials development and testing is conducted to ensure that safe, efficient, and cost effective transportation is available to support DOE operational needs. The program also provides transportation input to facility designs and environmental and safety analysis for DOE nuclear programs and Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) transport regulation development. This program will encourage private investment and use Federal funds only as necessary to prevent foreseeable shortages, and will then procure design and equipment from the industry.

In FY 1984, work will focus on research, development, and evaluation of nuclear materials transport systems to meet the Department's program requirements. This will include structural and thermal analysis and modeling, test environment characterization, testing facility development, transportation logistics and economic analysis, analysis of state and local government transportation-related legislation, preparation of emergency response guidelines for use with state emergency response organizations, and analysis of new DOT regulations on routing, including the possible requirements of prenotification of shipments. The major effort in FY 1984 will center on the development of transuranic waste transportation systems. In addition, certain engineering development technologies will be examined including laminated fabrication methods for transportation casks, ferritic iron design and fabrication methods, shock and vibration loads on packagings, seal design, handling technologies, and development of standards (including ASME Code cases). Work will also be conducted to develop risk assessment methods in connection with regulatory investigations. Operation of the transportation information services will continue as well as the maintenance of data bases on shipments, incidents, routing, and state and local legislation. Under guidance of the Albuquerque Operations Office, Sandia National Laboratory will continue to be the lead organization for carrying out this activity. However, the work will also be carried out by industry, universities, and other Department of Energy organizations in addition to Sandia National Laboratory.

	FY 1983 Appropriation	FY 1984 Request
Terminal Storage	$ 14,000	$ 20,800

The Waste Isolation Pilot Plant (WIPP), to be located in Eddy County about 25 miles east of Carlsbad, New Mexico, will provide a research and development facility for demonstrating the safe disposal of defense transuranic (TRU) waste and for conducting R&D on various types of defense high-level waste (HLW) in a stable geologic environment. The TRU waste will remain retrievable for up to five years, after which time a determination will be made whether it will be allowed to remain in the WIPP in perpetuity. The high-level waste experiments will be removed upon completion of the R&D activity.

A Final Environmental Impact Statement (FEIS) was issued in October 1980 and a 45-day comment period was allowed on that document. On January 22, 1981, DOE issued its Record of Decision on the FEIS. This decision is to proceed with WIPP as authorized in P.L. 96-164 "... as a defense activity of the DOE for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States."

Construction of permanent surface and underground facilities will proceed on a phased basis, consistent with the evaluation of data obtained during the SPDV exploratory program as defined in the FEIS. If significant new environmental data results from the SPDV program or other WIPP project activities, the FEIS will be supplemented as appropriate to reflect this data. The decision to proceed with phased construction and operation of the WIPP facility will then be reexamined in the light of that supplemental National Environmental Policy Act (NEPA) review.

Operating expense funding provides for the completion of Site and Preliminary Design Validation experiments initiated in FY 1983 and significant expansion of these efforts as the underground chambers are excavated. Specific work includes heater tests, simulated waste experiments, brine migration studies, and salt creep experiments. This work will be done by Sandia Laboratories. Sandia will also provide general geotechnical support of the WIPP project.

Independent environmental, health, and safety reviews will be conducted by the State of New Mexico Environmental Evaluation Group (EEG). This group, funded by DOE, provides independent peer review of all WIPP planning, design, and operations planning to ensure the health and safety of the citizens of New Mexico. In addition, minor support on geological issues is provided by the U.S. Geological Survey (USGS).

A new component of the operating budget is for facility operations transition. This component includes those activities necessary for the development of an operating facility, such as turnover procedures and maintenance documents. A gradual ramp-up of operating personnel and training is planned through the construction period so that facility operations can begin upon construction completion.

	FY 1983 Appropriation	FY 1984 Request
Program Direction	$ 2,000	$ 2,470

Program direction funds provide for the salaries, benefits, training, and travel expenses for 41 full-time equivalent (FTE) personnel associated with managing the Defense Waste and Byproducts Management program at DOE Headquarters. These employees are responsible for the administrative and technical support for program activities such as providing direction and control to the multiple DOE field installations involved in the program, interacting with other federal agencies, state and local government, and budget formulation and execution including Congressional authorization and appropriation hearings. The technical direction and administration of the broad and complex array of defense waste and byproducts management activities with a small Headquarters staff requires maximum utilization of available personnel. The technical management staff devotes primary attention to major program activities, such as: (1) the operation of radioactive waste management systems at seven major DOE nuclear installations; (2) research and development for the long-term management of radioactive wastes at four major installations; and (3) support of major projects including the Defense Waste Processing Facility at Savannah River, South Carolina, and the Waste Isolation Pilot Plant project near Carlsbad, New Mexico. An increase in FY 1984 is required to support the existing 40 FTE's and provide for a one FTE increase for planning/budget analysis.

Capital Equipment	$ 31,605	$ 33,900

The majority of the funding provides for essential equipment to support defense waste and byproducts management interim waste operation efforts at Idaho, Oak Ridge, Albuquerque, Hanford, Nevada, and Savannah River and to support landlord responsibilities at Idaho and Hanford. Equipment is also required to support long-term technology programs, including items necessary for waste experiments in the Waste Isolation Pilot Plant project.

Most of the 20-30 year old equipment at the Interim Waste Operations sites have reached a state of severe deterioration and obsolescence. Failures are frequent and maintenance costs in conjunction with the attendant radiation exposures to maintenance personnel have become unacceptable. In many instances, replacement parts are no longer available and equipment replacement is more cost-effective than equipment repair. The requested funding for capital equipment will provide for replacement items that are vital to the safety and reliability of continued operations.

Part of the capital equipment requirement is for surveillance of HLW tanks and for operational and maintenance activities associated with waste transfer, waste concentration, solidification, fractionation, encapsulation, and management of liquid waste streams at Hanford, Oak Ridge, and Savannah River. Similar requirements exist at Idaho to support the operation of the waste calcining facility and at Oak Ridge to support the operation of the hydrofracture facility. The interim waste operations program also provides the equipment for solid radioactive waste storage and disposal at DOE sites. This includes the receipt, handling, and disposal of solid low-level radioactive waste, and the segregation and retrievable storage of transuranic-contaminated solid waste. Typical examples of the equipment used include: manipulators, pumps, motors, agitators, in-cell hoists, filters, leak detection equipment, handling devices, earth-moving equipment, soil moisture probes, waste evaporator parts, valves, laboratory apparatus, equipment for process development and testing, radiation monitoring instruments for surveillance and maintenance, and compactors and other volume reduction instruments.

The interim waste operations program is also responsible for providing site landlord support and transportation equipment at the Hanford Reservation and at INEL. Examples of equipment necessary to support this activity are data processing equipment for centralized computer center operations; light and heavy automotive equipment; heavy equipment such as cranes, bulldozers, scrapers, graders, and trailers; safety, laboratory, and communications equipment; and general purpose office equipment. The increase provides for continuation of an equipment upgrade program to restore the safety and reliability of badly deteriorated general support facilities and equipment at Hanford and Idaho.

Equipment is also required to support decontamination and decommissioning projects. This equipment is usually large items with a life span of several years and replaces equipment where rental or lease costs exceed the equipment purchase price. Although some equipment may become contaminated during use in decommissioning operations, it will be reused on future decommissioning projects at DOE sites thereby reducing outyear costs. The following types of equipment will be procured: ventilation, monitoring, and breathing air systems; air and soil sampling, evaluation, and monitoring systems; disassembly and decontamination systems; waste handling systems; and replacement fans, motors, pumps, compressors, welding systems, and forklifts.

Long-term waste management technology major equipment requirements include: ion exchange columns, tanks and process instruments and controls, assay instrumentation, high temperature electric furnaces, and volume reduction process equipment. Smaller items are also required such as storage vessels, reaction heaters, gas flow controllers, particle generating system for filter testing, data recording system, scrubber liquid evaporation system, pulse height analyzer, hot sintering and press process instrumentation. In addition, testing equipment is required to evaluate the TRU transport vehicle and TRU waste canister performance and to complete the fabrication of the cesium/strontium transportation cask.

Capital equipment funding is also necessary in transportation research and development to support upgrading of impact test targets, and the upgrading of fire test facilities to achieve controlled temperatures during fire test. Supplementary computer hardware is needed to automate logistics and routing calculations and to construct a mockup of repository receiving facilities handling equipment to demonstrate receipt and shipment of packages. Test models of laminated, ferritic, and cast iron fabrication sections will also be constructed and supplementary computer hardware purchased for post-processing of finite-element code calculations to enhance future prediction by analysis.

Capital equipment funding also includes scientific instrumentation and data acquisition equipment associated with geologic and simulated waste experiments in support of the Waste Isolation Pilot Plant project.

	FY 1983 Appropriation	FY 1984 Request
Construction	$ 215,195	$ 268,700

Fundamental to achieving the goal of the Defense Waste and Byproducts Management program are the required construction efforts. Each project is discussed below:

84-D-150 General plant projects, interim waste operations and long-term waste management technology, various locations	$ 19,645	$ 25,830

The funding provides for various projects including construction, additions, upgrading, and replacement items that are required because of deterioration or obsolescence at the Albuquerque, Hanford, Idaho, Oak Ridge, and Savannah River sites. They are necessary to meet critical health, safety, and environmental needs in landlord support and in waste management operational activities. Also included is funding for emergency repairs to sustain normal operations. In addition, general support for the long-term waste management technology program will be provided.

83-D-157 Additional radioactive waste storage facilities, Richland, Washington	$ 19,000	$ 31,000

This project provides eight double shell tanks and support facilities for the storage of liquid waste removed from old tanks, waste from nuclear operations, and waste from PUREX processing of fuel from extended N-Reactor operations.

	FY 1983 Appropriation	FY 1984 Request
82-N-107 Rail replacement/Hanford railroad, Richland Washington	$ 6,000	$ 3,000

This project provides safety related upgrading of the Hanford railroad. Damaged and worn out rail, ties, and hardware will be replaced. Much of the railroad was built in 1943 with used rail and it has become unsafe. Upgrading is necessary to ensure the prevention of accidents during transport of radioactive and other materials on-site.

82-N-103 Waste handling and isolation facilities, Richland, Washington	$ 7,000	$ 3,570

This project provides capital funds for the isolation of old single shell tanks and related structures (e.g., sealing of tank openings); surveillance instrumentation for monitoring waste storage tanks; upgrading of the cathodic protection system to protect buried piping against corrosion; and improvements in the centralized Computerized Automatic Surveillance System for the waste tanks.

81-T-104 Radioactive waste facilities improvements, ORNL, Tennessee	$ 5,000	$ 4,000

This project improves and upgrades the radioactive waste management system at ORNL. Included in the project are upgrading of the off-gas and cell ventilation system, improvements to and modernization of the Waste Operations Control Center, and additions to the streamflow monitoring and control system. These modifications are required to maintain safe operations and to increase efficiency of operations at the ORNL site.

81-T-105 Defense Waste Processing Facility (DWPF), Savannah River, South Carolina	$ 40,000	$ 142,000

This project will provide facilities for solidifying the high-level radioactive waste at the Savannah River Plant (SRP) for temporary storage on-site, and for transportation to, and disposal in a federal repository. These facilities will immobilize the high-level waste in borosilicate glass in steel canisters. The canisters will be stored on the SRP site in air-cooled vaults until a federal repository is available. The DWPF will begin operation in FY 1989 and will process the backlog waste inventory over approximately 15 years.

The DWPF provides the final step in processing the high-level waste by converting it to an immobilized solid for disposal. Approximately 28 million gallons of high-level waste in the form of liquid, salt, and sludge have accumulated at SRP from production operations and an additional five to ten million gallons will be generated through the year 2000. Final processing of this waste for disposal had been deferred for almost 30 years. Immobilization of the high-level waste for eventual confinement in a geologic repository will insure the long-term isolation of the waste from the environment with minimal maintenance and surveillance. The process for immobilizing the high-level waste in borosilicate glass has been demonstrated and is ready for large-scale application. It is time for the Government to demonstrate the ability to handle high-level waste by properly preparing it for disposal rather than just continuing to store the increasing inventories in tanks that require periodic replacement.

The project was authorized for design in FY 1981 and FY 1982. The FY 1983 funding of $40 million continues the design leading to construction completion in FY 1989. The FY 1984 funding of $142 million is required for design, physical construction work, and to enter into subcontracts for the excavation, glass melter, process cell crane, main process building construction, instrumentation, canister storage building, electrical distribution system, construction support facilities and construction materials such as piping, pipe hangers, rebar, etc. The total estimated cost (TEC) for the DWPF is $910 million, a reduction of $60 million from the FY 1983 budget estimate. This reduction reflects design improvements and lower inflation estimates and can be maintained through effective contracting utilizing fixed price contracts where possible. This approach requires authority to enter into those contracts in FY 1984. If this is done, and if inflation continues to abate, the Department can reduce the TEC even further.

The DWPF will provide immobilized defense high-level waste for retrievable experiments in the WIPP in 1990. No other source of immobilized defense high-level waste will be available then.

	FY 1983 Appropriation	FY 1984 Request
77-13-f Waste Isolation Pilot Plant (WIPP), Delaware Basin, Southeast, New Mexico	$ 110,800*	$ 59,300

The successful completion of the exploratory program in mid-FY 1983 will result in the validation of the WIPP site and will allow full construction to begin. The existing administrative land withdrawal provides access to the site, but covers only the exploratory program. Legislative land withdrawal is required before the emplacement of waste can begin in 1989. A deferral of $50,000,000 of FY 1983 construction funds is proposed because an additional land withdrawal is necessary prior to the beginning of construction. However, the site validation program must be sufficiently complete to allow processing of the withdrawal application. These funds will be restored when the administrative land withdrawal is approved, allowing full construction to proceed. If circumstances permit earlier construction initiation, a budget amendment will be submitted for FY 1984. Fiscal year 1984 should be a peak year for construction activities. Site development, the water pipeline and storage tanks, and a warehouse will be completed. The primary waste handling shaft (19 feet in diameter) will be completed by enlarging the 6 foot diameter exploratory shaft. Completion of this shaft will allow construction of the waste handling building to begin. The major underground development will also begin. This extensive mining work includes experimental areas for both radioactive and non-radioactive experiments. It also includes mining of the four main entry tunnels into the waste disposal area. A significant accomplishment in FY 1984 will be the completion of detailed design (Title II) by the Architect-Engineer (Bechtel).

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* Includes $50,000,000 proposed for deferral until FY 1984.

FY 1984 Congressional Budget Request
Atomic Energy Defense Activities
Construction Projects Overview
Defense Waste and Byproducts Management
(Dollars in Thousands)

Project Number	Project Title	TEC	FY 1983	FY 1984 Request
84-D-150	General plant projects, interim waste operations and long-term waste management technology, various locations	$ 25,830	$ 19,645a/	$ 25,830
83-D-157	Additional radioactive waste storage facilities, Richland, WA	62,155	19,000	31,000
82-N-103	Waste handling and isolation facilities, Richland, WA	34,450	7,000	3,570
82-N-104	Waste transfer facilities, Richland, WA	6,750	2,750	0
82-N-107	Rail replacement/Hanford railroad, Richland, WA	12,000	6,000	3,000
82-BU-1	Byproducts Beneficial Uses Demonstration Plants	5,000	5,000	0
81-T-104	Radioactive waste facilities improvements, Oak Ridge National Laboratory, TN	21,000	5,000	4,000
81-T-105	Defense waste processing facility, Savannah River, SC	910,000	40,000	142,000
77-13-f	Waste isolation pilot plant, Delaware Basin, Southeast, NM	504,000	110,800	59,300
			$ 215,195	$ 268,700

a/ FY 1983 GPP (83-D-156, 83-D-159) shown for comparability purposes.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $25,830
Date: 1/82

7. Financial schedule (Prior year projects shown for comparative purposes)

		Costs			
Fiscal year	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior Years	$ xxx	$ 4,934	$ 0	$ 0	$ 0
FY 1982	12,532	2,324	3,325	2,415	4,468
FY 1983	19,645	0	11,786	7,859	0
FY 1984	25,830	0	0	8,995	16,835
		$ 7,258	$15,111	$19,269	$21,303

8. Brief physical description of project

These projects provide various items of new construction, additions, alterations, and improvements to the land, buildings and utility systems at the Albuquerque, Richland, Idaho, Oak Ridge, and Savannah River Offices to support waste management program needs in health, safety, environment, general support, and other program requirements.

These projects also provide for various items of new construction, additions, and alterations to the land, buildings, and utility systems at Savannah River in support of the Long-Term Waste Management program. This includes the cost of installation which is an integral part of general plant projects.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project

The estimate is based on the requirements of the various operating offices cited below:

Interim Waste Operations	
Albuquerque - Los Alamos National Laboratory	$ 400
Richland	6,600
Idaho	3,640
Oak Ridge National Laboratory	1,870
Savannah River	2,270
Richland - Landlord	5,660
Idaho - Landlord	4,700
Subtotal Interim Waste Operations	25,140
Long-Term Waste Management Technology	
Savannah River	690
Total Defense Waste	$ 25,830

Examples of subprojects under consideration are given below with preliminary cost estimates. A continuing study of requirements may result in changes, additions, or postponements.

Albuquerque - Los Alamos National Laboratory - Interim Waste Operations .... $ 400

Decontamination Facility ($200)

Vehicles routinely involved in the delivery of radioactive waste to the Area G disposal/storage site, and equipment utilized in disposal/storage operations at the site occasionally become contaminated. Also some equipment at the site periodically must be cleaned to be used in work at other laboratory facilities. All transportation routes from Area G involve travel over unrestricted public access roads. For these reasons, a decontamination facility at Area G is required to minimize any possible contamination spread. The decontamination facility will include a metal (prefab) building on a concrete pad. The building will measure approximately 25' x 35', with a high ceiling. High, wide roll-up doors at opposite ends will allow large equipment pieces to pass through the facility. High pressure steam and water will be utilized as the primary decontamination means. Because the disposal site does not have access to the Laboratory industrial sewer system, a liquid waste collection system and storage tank will be installed. Liquid wastes then will be hauled by truck to the Laboratory treatment facility as necessary.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Albuquerque - Los Alamos National Laboratory (Cont'd).

Egress Bay (Zone 3) Addition for the Treatment Development Facility (TDF) ($200)

A minor facility addition at the TDF would provide for the egress of equipment into and out of the Zone 2 process bays. The 23' x 40' addition would: (1) provide a Zone 3 ventilation control area; (2) enhance new process installation, modifications, and operations of present processes; and (3) provide for future decommissioning and removal of process equipment as demonstration projects are completed. The addition would provide for improved ventilation and contamination control for the TDF process areas.

Richland - Interim Waste Operations .... $ 6,600

Miscellaneous Capital Work Orders ($750)

These are miscellaneous jobs of a capital nature, which are necessary to maintain continuity of operation, protection of the environment, and to provide safeguards for the protection of life and property. Such jobs would include additions, improvements, and replacements of structures, building services, utilities, and associated equipment.

Laboratory Hot Cell Upgrade ($750)

This project will provide refurbishment and upgrading of three hot cells in the 222-S Laboratory, Cells 1A, 1E1, and 1F. As a result of more than 15 years of use, corrosive materials have deteriorated cell walls, floor pans, and utility connections. Cell cleanup is necessary in order to avoid cross-contamination of samples handled in the cells. Equipment requiring upgrading includes shielding windows, manipulators, etc.

219-S - 241-S Waste Transfer Lines ($1,000)

This project would provide two new waste transfer lines between 222-S Laboratory and the 241-S Diversion Station. The scope includes piping, encasements, detectors, etc., associated with waste transfer lines. Installation of these lines would enable DOE to abandon routing through the REDOX Facility, thus allowing shutdown of the Facility. The two new lines would allow a more direct routing of waste which would lesson the chance of misroutings, etc.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Richland - Interim Waste Operations (Cont'd)

Liquid Effluent Measurement System Upgrade ($900)

This project will provide design, procurement and installation of effluent measurement equipment for B-Plant cooling water and steam condensate. This upgrade includes alarm capability and sampling in the event of a high radiation alarm. The current system does not conform to DOE Orders and directives or national standards.

Hood Ventilation Modification ($1,000)

This project replaces selected sections of the stainless steel exhaust duct and portions of hoods in the 222-S Laboratory. An estimated 40 hoods and attendant sections of exhaust ducting have been identified as requiring replacement.

Evidence of severe deterioration from acid corrosion has been noted in the hoods and hood exhaust system. The laboratory is expected to be in service for 20 or more years. To maintain the integrity of the laboratory and reduce the risk of contamination of clean areas, the duct system needs replacement.

An engineering study will be done to identify specific sections in need of replacement and the most cost effective methods of replacement and provide a technical basis for a cost estimate.

Tank Farm Operability Improvements - 200 East ($600)

This project will provide modifications to existing salt well system and receiver vessel facilities in the 200 East Area. Modifications will be done to improve the overall systems operational efficiency and safety. Included in the project scope will be jet pump pit heating, receiver vessel piping heat tracing, service pit heating and instrumentation and electrical system improvements necessary to system safety, maintainability and operational efficiency.

Tank Farm Operability Improvements - 200 West ($600)

This project will provide modifications to existing salt well system and receiver vessel facilities in the 200 West Area. Modifications will be done to improve the overall systems operational efficiency and safety. Included in the project scope will be jet pump pit heating, receiver vessel piping heat tracing, service pit heating and instrumentation and electrical system improvements necessary to system safety, maintainability and operational efficiency.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations
2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Richland - Interim Waste Operations (Cont'd)

Gable Mountain Pond Upgrade ($1,000)

Low-level radioactive liquid effluents are discharged to Gable Mountain Pond. The pond shoreline requires upgrading to eliminate animal habitat, prevent vegetation uptake of radionuclides, and reduce the potential for resuspension from shoreline sediments. Dikes surrounding the Gable Mountain Pond overflow will be improved to prevent possible failure and release of pond contents to the surrounding environment.

Idaho - Interim Waste Operations $3,640

RWMC Intermediate Level Transuranic Storage Facility (ILTSF) Vault Procurement and Installation ($510)

This project will expand present ILTSF capabilities by 40 vaults to fulfill requirements forecasted by on-site and off-site waste generators.

Vault storage capacity will be exhausted by the end of FY 1984 without the installation of these additional vaults. DOE-ID is charged with providing vaults for storage of transuranic waste generated by DOE facilities and no viable alternative exists.

A typical storage vault consists of a carbon steel cylinder buried in the earth berm and supported by a sand-cement grouting such that its longitudinal axis is vertical and its upper end extends approximately four inches above the pad surface.

Air Support Weather Shield ($460)

This project will provide an Air Support Weather Shield (ASWS) on the Transuranic Storage Area (TSA) Pad-3 to protect against moisture coming in contact with the exposed TRU containers and compromising the storage integrity. The ASWS will be used for interim storage of certified and non-certified TRU waste in association with the Stored Waste Examination Pilot Plant, the Processing Experimental Pilot Plant and Waste Management Operations. An all-weather working environment for personnel is a necessity for the safe handling of TRU waste during adverse weather conditions to provide contamination and radiological controls. This construction project will consist of the air structure, inflation-air system, airlock, truck and personnel access doors, and a metallic halide lighting system. Propane gas, utility electric power, security, and fire safety items will be provided to support ASWS operations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Idaho - Interim Waste Operations (Cont'd)

WERF Expansion - (SPERT III) ($670)

This project consists of expanding the existing Waste Experimental Reduction Facility (WERF) building to improve processing flow conditions and enable development of remote waste handling techniques. This WERF project addition includes electropolishing, freon decontamination, additional remote waste handling capabilities and shielding so that high activity waste can be handled.

CPP - 604 Cell Hatch Covers ($250)

CPP-604 was constructed such that on several cells the cell ceilings and their cell hatch plugs form the exterior roof of the building. The asphalt cell roofing has deteriorated and there is no effective way to seal around the cell hatch plugs. These conditions allow rain and melted snow to enter the cells where the water becomes contaminated. It is estimated that approximately 50,000 gallons of such water enter the cells each year. This water must be processed through the process equipment waste evaporator system at a cost of one dollar per gallon. This project will remove the existing asphalt, seal the concrete structure, and install steel covers over the cell hatches so that water will not leak into the cells.

CPP-604 Process Equipment Waste (PEW) Evaporator Upgrade ($750)

By operating the two PEW evaporators located in CPP-604 in series, the amount of radionuclides in the evaporator overheads which are sent to the service waste system can be reduced by 20 to 50 percent. Also, the carbon steel vessel supports in PEW Evaporator System II are nearly corroded away. Complete failure of the vessel supports would leave the valves, vessels, and piping necessary to operate evaporators in series being supported by the piping only and the system would have to be shut down. New stainless steel vessel supports to restore the system integrity will be installed. Work platforms will be added in conjunction with the vessel supports so that maintenance can be performed without building new scaffolding in a high radiation area each time maintenance is performed.

CPP-604/605 Utility Line Replacement ($700)

The steam, compressed air and treated water lines in building CPP-604/605 (Waste Facility) have been in service for 30 years and are badly deteriorated. Numerous leaks in the piping, fittings, and valves have required excessive maintenance. The systems have been shut down for repairs four times in the past two years to repair approximately 30 leaks. A shutdown to repair a leak in one of these utilities requires that utilities to the entire facility be shut down since there are no

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Idaho - Interim Waste Operations (Cont'd)

isolation block valves on branch lines. A failure of the steam lines would shut down the PEW evaporators, the building heating system, and the off-gas system superheaters. A failure of the compressed air lines would disable the pneumatic instrumentation to the tank farm, the PEW evaporators and the off-gas filter systems; and failure of the treated water lines would incapacitate the condensers and thereby the PEW evaporators. This project will replace the steam, compressed air, and treated water headers, including isolation block valves on branch lines in CPP-604/605 thereby reducing maintenance and restoring the integrity and reliability of the sytems in the facility.

Maintenance Building Contaminated Waste Line ($300)

This project will provide for installation of a waste transfer line from the maintenance building waste sump to the PEW evaporator hold tank (WL-102). Waste in the waste sump would then be sampled for contamination; if contaminated, it would be transferred directly to the PEW evaporator hold tank without passing through the waste monitoring station and would thereby reduce the amount of waste to be evaporated.

The Idaho Chemical Processing Plant (ICPP) Maintenance Building has an area for working on lightly contaminated equipment and a vessel for treating potentially contaminated quench pumps from the New Waste Calcining Facility (NWCF). The maintenance area and the test vessel drain to a waste sump from which the waste is pumped to the service waste system through the waste monitoring station in CPP-753. Service waste from several other ICPP facilities (NWCF, Atmospheric Protection Building, Fluorinel Dissolution Process and Metal Clad Fuel Storage Facility) is also routed through CPP-753. Should waste which is being transferred from the Maintenance Building (in batches of approximately 2,000 gallons) be contaminated, the waste monitoring station would divert it along with noncontaminated waste from the other ICPP facilities to the contaminated waste storage tank (WM-191). Due to the simultaneous diversion of both the contaminated and the noncontaminated waste to WM-191, the contaminated waste becomes mixed with a large quantity of noncontaminated waste and is consequently diluted by a factor of 10 to 15. The resulting diluted, contaminated waste must then be processed through the process equipment waste (PEW) evaporator at a cost of one dollar per gallon.

Oak Ridge National Laboratory - Interim Waste Operations $1,870

Engineered Groundwater Barriers, Trench 7 ($435)

This project provides for the installation of a passive, engineered groundwater barrier system for Trench 7. The diversion barrier and drain system consists of approximately 1000 ft. of 3 ft. wide x 25 ft. deep trench, an emplaced 12-inch diameter drainage tube with localized crushed limestone backfill, and a vertically placed filter fabric curtain.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Oak Ridge National Laboratory - Interim Waste Operations (Cont'd)

A major source of the groundwater recharge in Trench 7 is the lateral flow from upslope areas outside the actual disposal site. If the lateral groundwater flow can be intercepted and diverted, the groundwater tables in the waste disposal area would be lowered significantly, and leaching and subsequent migration of radionuclides into White Oak Creek from this source would be reduced. The diversion barrier and drain system to be installed will accomplish this redirection of the flow of groundwater away from Trench 7 and is part of a continuing effort to improve ORNL Radioactive Waste Management practices.

Weatherize Melton Valley Tank Equipment ($50)

This project provides for the construction of a metal roof over the exposed tank and vault off-gas equipment and transmitter racks at the Intermediate Level Waste storage tank complex in Melton Valley.

This equipment and instrumentation is exposed to the weather. Protection will extend the lifetime of the equipment.

Anaerobic Waste Digester ($535K)

This unit will be located on the NE corner of the New Waste Hydrofracture site, and will consist of a 40,000 gal. digester, a shredder and a pulper, and feed/mixer units for chemical additions. The unit will be enclosed in a 30x50 foot pre-engineered metal building, which will also contain a 40,000 gallon surge/storage tank in order to provide for continuous operations. Approximately 15,000 ft^3 of cellulosic waste material can be processed using only day shift operations. The digester will provide approximately 50 to 1 volume reduction, which will reduce the volume disposed at the ORNL low-level waste burial ground.

Hydrostatic Head Measuring Station, SWSA # 6 ($350)

This work consists of drilling and casing approximately 5 clusters of three wells (100, 150, and 200 ft. in depth) in Solid Waste Storage Area (SWSA) #6. These wells will be used to monitor hydrostatic pressure in the strata underlying SWSA #6 as part of the groundwater monitoring program at ORNL. Measurement of the changes in hydrostatic pressure can allow prediction of changes in depth of the water table, determination of changes in formation porosity, and monitoring for radioactivity which may migrate from buried radioactive waste through fractures in the underlying rock.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations
2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Oak Ridge National Laboratory - Interim Waste Operations (Cont'd)

Evaporator Facility Improvements ($50)

This project consists of installing a stripping column and automatic process control instrumentation in the Evaporator Facility at the Process Waste Treatment Plant.

The evaporator feed stream in the manually-controlled ion exchange treatment process is concentrated in nitric acid. As much as 80% of the nitric acid can be recovered and recycled if a stripping column and improved process control instrumentation are installed. Requirements for neutralizing agents would decrease accordingly. Incorporation of these modifications would result in a projected annual savings of approximately $60,000 in the operation of the facility.

Facility for Handling Very High Activity Waste ($450)

This project provides for the installation, in the Fission Product Development Laboratory, of handling and process equipment, and shielding for the dissolution of high-activity beta-gamma waste.

High Flux Isotope Reactor (HFIR) control plates can be dissolved in order to dispose of this low volume of very high activity waste by injection in the New Hydrofracture Facility rather than by shallow land burial. This is part of a continuing effort to improve ORNL radioactive waste management practices.

Savannah River - Interim Waste Operations $2,270

Equipment Storage Building ($950)

A storage building is needed to house contaminated equipment requiring repair or modifications at the Waste Management Maintenance Facility. The building will be a reinforced concrete structure with epoxy paint lining. The annual quantity of failed equipment is increasing due to the expanding waste management system. In addition, significantly larger amounts of failed, highly contaminated equipment will result during the waste transfer program. Presently, contaminated equipment must be shipped to the Burial Ground for interim storage, increasing the potential for personnel contamination and accidental releases to the environs.

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Savannah River - Interim Waste Operations (Cont'd)

Operating Supplies Storage Building ($120)

This project will provide a building to store equipment and materials required for the routine operation and maintenance of the tank farms. This building will allow the consolidated location of operations materials and equipment, thus improving efficiency and reducing the time required to perform routine operations and maintenance tasks.

Ground Cover for Waste Management Areas ($500)

Slopes surrounding above-ground waste tanks require treatment to stabilize the soil. Eroding soil dams and culverts plug storm sewers, creating housekeeping and maintenance problems. Soil erosion is taking place in many areas of the tank farm and additional treatment is required. This project will include contouring, grading, paving, seeding, and other erosion-control measures.

Replace Service Piping ($200)

This project will provide for upgrading failing general service piping in the old waste tank farm areas, which has deteriorated due to age. This upgrading will consist of replacement of sections of the transfer lines.

Burial Ground Equipment Storage Building ($250)

A building is required in the 643-G burial ground to protect heavy equipment and vehicles from the weather and to provide a protected work area where maintenance work can be done. Waste Management operations has the responsibility for providing equipment and vehicles required for burial ground maintenance. This equipment was recently purchased and is being stored in the open, contributing to earlier deterioration.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Savannah River - Interim Waste Operations (Cont'd)

Certified TRU Waste Storage, Receiving and Shipping Facility ($250)

This project provides a facility to receive, certify, and store transuranic (TRU) waste prior to shipping to the Waste Isolation Pilot Plant (WIPP). This facility is needed to assure that SR-generated TRU waste meets the WIPP certification compliance requirements and to assure adequate storage for the SR TRU waste inventory until shipment to WIPP beginning in approximately 1992.

Richland Landlord - Interim Waste Operations $5,660

Miscellaneous Capital Work Orders ($760)

These are miscellaneous jobs of a capital nature, which are necessary to maintain continuity of operation, to protect the environment, and to provide safeguards for the protection of life and property. Such projects include additions, improvements, and replacements, of structures, building services, utilities, and associated equipment.

Electrical Metering, 200 Areas ($950)

This project will provide approximately 96 electrical metering installations for individual building services in the 200 Areas. It is part of a site-wide energy management program which will monitor usage, identify potential energy savings, and apply cost effective conservation measures. The installations will consist of instrument transformers and pulse generating watt-hour demand meters which will eventually permit the information to be automatically collected and transmitted to a central location and processed for analysis.

Sprinkler System Upgrade ($350)

This project will install automatic fire sprinklers, fire-rated walls and smoke alarm systems in the 200 Area General Purpose Landlord Buildings, automatic sprinklers and fire-rated walls in 2723-W, fire alarm systems in 271-T and 202-S; and fire-rated doors in 271-B, 224-B and 271-U.

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Richland Landlord - Interim Waste Operations (Cont'd)

Reline Coal Bunkers - 284-E ($850)

This project will reline existing coal bunkers. The coal bunkers are 37 years old. Holes have developed in the bunkers, and there is severe wear on the inner surfaces. A sudden large hole in the bunkers and the resulting coal fall could severely injure someone and damage equipment.

Equipment Maintenance Facility ($1,000)

This project will provide for a new, fully-equipped, non-contaminated mobile equipment maintenance facility consisting of a light duty bay, heavy duty bay, and an office area. The back half of the site will be used as a parking/storage area. The 2713-W Facility will be demolished and removed.

Warehouse System Upgrade - 1166 Building ($800)

This project will renovate the 1166 Building. The FY 1984 GPP will: install a loading dock; upgrade material handling systems; install parts and material storage and retrieval systems and provide structural reinforcement to the roof.

Widen and Repave 200 Area Roads ($500)

The road to be upgraded runs from Beloit to 23rd Street between buildings 221-T and 224-T. This section of road is presently used by site buses, light duty trucks, and cars. Tasks necessary to upgrade the existing road are: widening the existing road by up to 8 feet, releveling and filling of the road from Section 5 of the Canyon Building (221-T) to Section 11 and at the Southwest corner of 221-T, removal of three cathodic protection posts, relocation of a radiation zone boundry (at Canyon Section 7) to provide area for straightening of the road, and application of 1-1/2 inches of asphaltic concrete.

Substation Fire Protection Water Supply Buildings - 100-D Area ($450)

Electrical substations for 181-D and 182-D buildings in the 100-D Area provide power to pump supplying water to the 200 Areas and 100-D Areas for fire protection, process test, and sanitary use. This project will provide the substations with fire protection to safeguard against total loss. It is recommended that fire barriers be installed between the individual transformers and between the transformers and adjacent buildings.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Richland Landlord - Interim Waste Operations (Cont'd)

The present layout and location of these substations violate the National Electrical Code and Factory Mutual recommendations for transformer fire protection. The severity of fire hazard associated with oil-filled transformers is due to confining a combustible liquid. The danger is that substation fire could easily involve both transformers and the wooden switching structures resulting in a total outage of the export water primary pumping station. The outage could extend as long as 12-months until replacement transformers could be obtained thus leaving the pumping station at 100-B Area as the only source of water for the 200 Areas. Reliance on a water supply with no backup could force mandatory curtailment of water usage. Also, a substation fire could easily spread to the pumphouse building causing further damage and prolonging repair outages.

Idaho Landlord - Interim Waste Operations $4,700

Central Facilities Area (CFA) Office Building #2 ($900)

This project will provide a pre-engineered office building for 80 employees who are now presently housed in 35 year old temporary facilities. This diverse group of facilities (bungalows and trailers) has functionally deficient space, no longer meets current electrical standards, and does not meet DOE guidelines for a safe and adequate working environment. Several savings objectives can be achieved by consolidation of the office activities from various bungalows (former housing) and temporary trailers into one facility. Improvement can be expected in operational efficiency, reduction of energy use, operating and maintenance cost and the elimination of future capital investments in deteriorating facilities. Facility inspection data indicates that current cost estimates for each bungalow's electrical upgrade will exceed $10,000 if this project is not completed. The alternative upgrading of existing facilities will not resolve the other problems addressed by this project.

CFA-668/689 Building Upgrade ($300)

This project consists of renovation of the 2nd floor office area and remodeling of CFA-688 lab space. Completion of Phase II of the Idaho Lab Facility (ILF) will result in the vacation of office and lab space in CFA-668/689 that will require new functional design and layout to satisfy needs. This project is consistent with the Master Plan objectives for building consolidation. This upgrade will provide adequate space for the Auxiliary Reactor Area II (ARAII) personnel, allowing for decontamination and decommissioning of the ARA II facility. It will also provide additional office space for employees now located in old deficient houses or temporary trailer houses. This project will minimize the requirement for new additional construction and reduce current energy use, operating and maintenance costs. It will provide a safe and more efficient working environment for office employees at CFA.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Idaho Landlord - Interim Waste Operations (Cont'd)

Multi-Craft Shop #3 ($900)

This craft shop will house the electrical line crew and machine shop, including all associated equipment and functional work areas. The craft shop is needed to consolidate the location of craft functions into a centralized area for improved craft work coordination and space utilization. It will eliminate deficiencies in existing facilities such as inadequate floor space, and deterioration of electrical, mechanical and structural components and systems. The shop will also improve energy efficiency.

Test Area North, Water Reactor Research Test Facility, Semiscale Motor Control Center (MCC) #1 and #2 Upgrade ($300)

The existing MCC #1 and #2 will be replaced by a modern unit meeting current National Electrical Manufacturers Association (NEMA) standards and will be suitable for 480 V, 60 Hz, 3 phase, 4 wire service and interrupting duty and future additional capacity. New branch circuit wiring will be installed in existing or new conduit, as required to correct current code violations and meet specified safety standards. The existing utility systems are required to support current and future programmatic commitments, and they require ever increasing maintenance to remain operational. A system failure occurring during a Semiscale test would abort the test causing lost time, manpower and money.

WRRTF Semiscale (MCC) #3 Upgrade ($200)

The existing MCC #3 will be replaced with a modern unit meeting current NEMA standards and will be suitable for 480 V, 60 Hz, 3 phase, 4 wire service and interrupting duty and future additional capacity. New branch circuit wiring will be installed in existing or new conduit, as required to correct current code violations and meet specified safety standards. The existing utility systems are required to support current and future programmatic commitments, and they require ever increrasing maintenance to remain operational. A system failure occurring during a Semiscale test would abort the test, causing lost time, manpower and money.

TAN-607 Dimensional Control Addition ($200)

This project provides for a dimensional control laboratory facility which will be located in the southeast corner of TAN-607. The basic function of this structure will be to provide separation of the close tolerance machine operations and inspection from the machine shop environment. It will also provide improved stable temperature and humidity control. Quality control inspection and close tolerance machine work is too costly and difficult to perform in the TAN-607 Machine Shop. The current shop bays do not provide the adequate environmental control required for precision work.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Idaho Landlord - Interim Waste Operations (Cont'd)

Test Reactor Area (TRA) Security Uninterrupted Power Supply (UPS) System ($100)

This project will consist of a new UPS system for the security system to replace the battery-backed power system located in the Engineering Test Reactor (ETR). This project includes a new 20Kw UPS with switchgear, batteries and other related electrical installation materials. The UPS will be located in TRA-609 (steam plant). The system will be connected to a commercial power source. The new system eliminates the need for high maintenance rotating machinery Motor-Generator (MG) set. The existing power source for the security system does not have instananeous switching capability as required by DOE Order 5632.1.

TRA Hot Cell Personnel Padiation Survey Station ($50)

This project consists of installing a shielded personnel radiation survey station at the TRA Hot Cell (TRA-632). This installation will include a walk-through personnel monitor and appropriate shielding from fixed sources of background radiation. The high radiation background in the Hot Cell makes it difficult to obtain a meaningful personnel contamination survey. Currently, anyone leaving the Hot Cell must perform a survey with a handheld instrument in the high radiation background then proceed to the ETR or Material Test Reactor (MTR) Health Physics office for additional personnel survey prior to leaving the area. This practice leads to the possible spread of contamination. This problem has been identified in a DOE-ID appraisal as a safety item that requires correction.

TRA Firewater Deluge System and Pilot Piping Upgrade ($50)

This project consists of replacing the existing Advanced Test Reactor (ATR) Cooling Tower Firewater Deluge System and pilot piping with corrosion resistant piping. The present piping system is completely corroded. There have been numerous leaks, and part of the system is currently inoperable. When leaks occur, the automatic fire protection system has to be shut off and a manual system must be used. Using the manual system could impact the operation of the secondary reactor coolant system on backshifts or weekends.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations	2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Idaho Landlord - Interim Waste Operations (Cont'd)

TRA Hot Cell Iodine Adsorber Upgrade ($400)

This project consists of design, fabrication, procurement and installation of two iodine adsorber units (containing silver zeolite, AgX) in the exhaust system of TRA Hot Cell #1 plus remote mechanical bypasses for all three hot cells to allow bypassing the iodine adsorbers. AgX is superior to the existing charcoal filters in adsorption efficiency, has a longer service life and does not require fire protection in the exhaust system. The bypass will allow placing the iodine adsorbers into service only as needed, thus prolonging the life of the AgX.

If this system is not installed, there will be a continuing hazard to personnel at TRA associated with the potential for unanticipated releases of radioactive iodine from the Hot Cells. Post-irradiation fuel examination schedules must be delayed to limit the iodine potential. The present charcoal adsorbers constitute a fire hazard with increased potential of particulate release.

Hazardous Chemical Waste Storage Facility ($500)

This project consists of design and construction of a facility for interim storage of non-radioactive hazardous waste. An adequate facility for storage of hazardous chemical waste for the time between removal from the various use locations and disposal (or shipment off-site for disposal) does not exist. The location of this material is near the Security Firing Range and it lacks safe, adequate facilities for separation of chemical waste from explosive waste.

Explosive waste will remain at the present remote location. The proposed project will provide a weatherproof facility for non-explosive material storage with all weather access to facilitate shipment. The volume of material stored in the proposed facility will be based on a three month maximum storage time.

INEL Protective Device Upgrade ($300)

This project consists of replacing overcurrent protective relays, curcuit breakers and associated hardware on the INEL electrical distribution system. The devices, which are obsolete and inadequate to safely interrupt a short circuit, require restoration at the Scoville, TRA, TAN, and Power Burst Facility (PBF) Substations. These deficiencies were identified as the result of a relay coordination and short circuit study. Failure to correct these deficiencies could result in costly major equipment damage and multi-programmatic delays if a short circuit is not adequately interrupted.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Idaho Landlord - Interim Waste Operations (Cont'd)

Substation Fire Protection ($300)

This project consists of the design and construction of fire protection barriers and curbs to separate adjacent transformers at several high voltage substations. These transformers are less than 50 feet apart or are 50 feet or less from a building structure. In the event of an oil leak, fire, or explosion in one transformer or a building fire, both transformers could easily be damaged and thereby interrupt the power supply to the areas these transformers serve. The areas included are the Naval Reactor Facility (NRF), PBF, ICPP, TRA and Loss of Fluid Test (LOFT) Facility. Barrier walls and curbs would limit damage to one transformer and allow emergency service to continue.

INEL FY 1984 Road Program ($200)

This project consists of the design, construction, and/or renovation of parking lots and secondary roads at various locations within the INEL. The parking lots proposed for this project are at present either unpaved or have been patched continually in recent years in order to maintain serviceable parking facilities. Secondary roads provide access to newly located facilities which require smooth surfaces capable of safe, uninterrupted transport of radioactive waste.

Savannah River - Long-Term Technology ....$ 690

Minor Projects, each $75,000 or less ($320)

A continuing need exists for capital improvements, each costing $75,000 or less, to general plant facilities to assure continued safe operation of plant structures and utilities to support the technology program.

Sanitary Waste ($175)

Package sanitary waste disposal plant including holding tanks, digester, pumps, etc. This package meets latest State and Federal regulations. It also meets the needs for increased capacity associated with the large increase in staff at TNX for additional high-level waste technology effort.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No. 84-D-150

9. Purpose, justification of need for, and scope of project (cont'd)

Savannah River - Long-Term Technology (Cont'd)

Metallurgical Laboratory ($195)

Development of containerized glass-waste packaging for the DWPF has increased the need for seal welding and testing DWPF canisters. Presently, a majority of the lab work is performed in 700-Area Technical Division which requires transporting the work back and forth. No lab exists at the TNX facility for this type work at this time and this project will provide the needed facility for a more efficient operation.

10. Details of cost estimate

It is not possible to provide a detailed cost estimate for the projects. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

11. Method of performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and by subcontracts awarded competitively.

12. Funding schedule of project funding and other related funding requirements

No applicable to projects with a total estimated cost of less than $5 million each.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable to projects with a total estimated cost of less than $5 million each.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986[1]

5. Previous cost estimate: $ 62,700
Date: 1/82

6. Current cost estimate: $ 64,000
Less amount for PE&D: 1,845
Net cost estimate: $ 62,155
Date: 4/82

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1983	$ 19,000 [2]	$ 19,000	$ 19,000	$ 18,000
1984	31,000	31,000	31,000	19,300
1985	12,155	12,155	12,155	18,360
1986	0	0	0	6,495

8. Brief physical description of project

This project will provide eight additional underground double-shell tanks for high-level radioactive waste; encased piping to existing waste crystallizer and storage tank systems; instrumentation and auxiliary equipment for monitoring; and additional support and auxiliary facilities and improvements for controlling radioactive waste to minimize the potential for leakage to the environment.

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[1] Completion date is accelerated from original completion date of 1st Qtr. FY 1987.
[2] Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington	2. Project No. 83-D-157

8. Brief physical description of project (cont'd)

The tanks will be designed similarly to existing one-million-gallon double-shell tanks, which consist of a free-standing, stress-relieved, carbon steel tank within a carbon steel-lined, reinforced concrete vault. The tanks will be equipped with pumps, pump pits, slurry distributors, circulators as required, integral leak detection, radiation, temperature, pressure, liquid level, and sludge level instrumentation, high efficiency filter systems for ventilation exhaust, utilities, instrument air, area radiation alarms, and controls.

The tanks will be instrumented to detect any leakage from the primary to the secondary shell. Equipment will be available for removing the waste from the secondary shell, if required. Exhaust air will be double-filtered through high-efficiency filters. Measurement of radioactivity released to the environment will be continuous, and concentration of radioisotopes released will be maintained below agency guidelines. Liquid level and temperature instrumentation will be monitored by the Computer Automated Surveillance System.

Heat-traced and encased piping will be provided for: (a) transferring waste supernate from new tanks to the waste evaporation facilities; (b) transferring concentrate from the waste evaporation facility back to the new tanks; and (c) transferring waste to and from other facilities, as required. The pipelines will be constructed with encasements for secondary containment of the radioactive waste. Leak detection devices and pressure testing capabilities will be provided for the encased piping to permit routine monitoring for leaks. Leakage into the encasement due to failure of the primary piping will drain to and be collected in double-contained waste storage tanks or catch tanks as required.

The support and auxiliary facilities and improvements for control of radioactive waste will include diversion boxes, valve pits, control rooms, provisions to reduce radiation exposure, and improvements to evaporation facilities and other processes for volume reduction of high-level waste. The FY 1984 funds will be used to continue tank fabrication and construction.

9. Purpose, justification of need for, and scope of project

Purpose: The proposed waste storage facilities are required for storage of radioactive waste at the Hanford Site from: (a) the restart of PUREX, (b) the interstitial liquid from the stabilization of single-shell tanks; (c) the increases in volume of the residual liquid concentrate; and (d) the conversion of N Reactor from the production of fuel grade to weapons grade plutonium and extension of its operation to the mid-1990's.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

9. Purpose, justification of need for, and scope of project (cont'd)

Justification: A major goal was reached in FY 1981 with the removal of all 149 old single-shell high-level waste tanks from active liquid service which is now provided exclusively in double-shell tanks. The tanks and auxiliary facilities proposed in this project will help stabilize waste in the old single-shell tanks by accepting drainable liquids that are now held interstitially in the salt cake material. This reduces the potential for accidental release of radioactive waste to the environment. Based on actual operating experience, the projected interstitial drainable liquid that can be recovered from the single-shell tanks has doubled over earlier projections. The new tanks will also provide capacity to store the increased volume of liquid concentrates.

Earlier estimates of required waste storage capacity were based on the assumption that N Reactor would operate only through 1983 and produce fuel grade plutonium as opposed to weapons grade plutonium. The decisions to convert from fuel grade plutonium to weapons grade plutonium and to extend the operation of N Reactor through mid-1990's will increase the amount of fuel to be processed through the PUREX reprocessing plant, thereby increasing the amount of waste which will be generated and will require storage.

Failure to provide this project would cause one or more of the following impacts:

- The removal of interstitial drainable liquids from the salt cake stored in single-shell waste storage tanks would be delayed, thereby increasing the potential leakage of liquids from cracked tanks to the environment.
- N Reactor operations would have to be curtailed, new fuel storage space would have to be constructed, or radioactive fuel shipments would have to be made to other processing facilities.

These tanks will also provide storage capacity for liquid waste from other Hanford operations.

Scope: This project includes the engineering, design, inspection, land improvement, and procurement for the construction of eight double shell waste tanks and auxiliary facilities at Hanford.

10. Details of cost estimate[a]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 5% of construction costs, item b		$ 2,775[a]

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[a] Based on completed conceptual design and approximately 35% completed definitive design (excludes PE&D).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

10. Details of cost estimate (cont'd)

	Item Cost	Total Cost
b. Construction costs		$ 51,275
(1) Improvements to land including excavation, backfill, and grading	$ 1,080	
(2) Special facilities including one-million-gallon storage tanks, collection tanks, piping, instrumentation and ventilation systems	49,295	
(3) Utilities, including electrical power, water, and steam	900	
Subtotal		54,050
c. Contingency @ approximately 15% of above costs		8,105
Total Project Cost		$ 62,155

11. Method of performance

Design will be performed under a negotiated architect-engineer contract. The major portion of construction and procurement will be accomplished under fixed-price contracts awarded competitively. A small amount of work, primarily tie-ins to contaminated waste lines within potentially contaminated zones, will be done by the onsite contractor. The project schedule and funding requirements reflect early placement of orders for long-lead time items.

12. Funding schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$18,000	$19,300	$18,360	$ 6,495	$ 0	$ 62,155
(b) PE&D	1,845	0	0	0	0	0	1,845
(c) Expense funded equipment	0	0	0	0	180	30	210
Total facility costs	1,845	18,000	19,300	18,360	6,675	30	64,210

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

12. Funding schedule of project funding and other related funding requirements (cont'd)

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
2. Other project costs							
(a) R&D necessary to complete construction .	$ 250	$ 0	$ 0	$ 0	$ 0	$ 0	$ 250
(b) Other project related costs	710	480	530	580	580	175	3,055
Total other project costs	960	480	530	580	580	175	3,305
Total project costs (item 1 & item 2).	$ 2,805	$18,480	$19,830	$18,940	$ 7,255	$ 205	$ 67,515

b. Other related annual costs (estimated life of project: 50 years)

1. Facility operating costs	$ 550
2. Capital equipment not related to construction but related to the operating effort in the facility	60
Total other related annual costs	$ 610

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Expense funded equipment

These funds will provide critical spare parts (pumps, piping, etc.) needed to operate this facility.

2. Other project costs

(a) R&D necessary to complete construction

The estimated conceptual design effort for this project is $206,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Additional radioactive waste storage facilities, Richland, Washington	2. Project No. 83-D-157

13. Narrative explanation of total project funding and other related funding requirements (cont'd)

(b) Other project related costs

These costs are associated with project management activities and include design review, safety reviews, technical direction, quality assurance, radiation monitor coverage, etc.

b. Total related funding requirements

1. Annual operating expenses directly related to the facility

These costs are associated with the cost of operating the waste storage tank farm. They include utilities, maintenance and repairs, operations surveillance, engineering and other related expenses. Total waste concentration operating cost for Hanford is approximately $16,000,000 per year.

2. Capital equipment not related to construction but related to operating the facility

This cost includes equipment for the minor upgrading of facilities to improve monitoring, surveillance and containment, and facilities or modifications to reduce environmental releases and personnel exposure.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

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3. Date A-E work initiated: 4th Qtr. FY 1979

5. Previous cost estimate: $34,450
Date: 2/81

3a. Date physical construction starts: 2nd Qtr. FY 1982

6. Current cost estimate: $36,000
Less amount for PE&D: 1,550
Net cost estimate: $34,450
Date: 1/82

4. Date construction ends: 2nd Qtr. FY 1990[a/]

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7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1982	$ 34,450	$ 10,000	$ 10,000	$ 826
1983	0	7,000	7,000	7,000
1984	0	3,570	3,570	7,000
1985	0	8,000	8,000	9,550
1986	0	5,880	5,880	7,000
1987	0	0	0	1,874
1988	0	0	0	500
1989	0	0	0	500
1990	0	0	0	200

8. Brief physical description of project

This project will provide the facilities, processes and/or structures for the isolation of single shell waste storage tanks, surveillance instrumentation to monitor waste storage tanks, stabilization and contaminated areas and facilities, and measures to minimize the potential for release of radioactive materials to the environment.

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a/ Construction completion date has been changed to be consistent with operating program requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

8. Brief physical description of project (cont'd)

The following are representative examples of the facilities, processes and/or structures provided by the capital funds for this project:

a. All old single-shell waste tanks will be isolated from the active waste handling system. Piping will be disconnected and capped; and risers and ventilation systems will be sealed. This will prevent the inadvertent addition of liquids into the tanks after liquids have been removed during the stabilization effort.

b. Sealing of single-shell auxiliary waste storage tanks, vaults, pits, related containment vessels, pumping equipment, dome risers, pit drains, etc., against unplanned addition of liquids by installation of at least one positive physical barrier to dome risers, water, steam, air, process lines, etc. If a structure cannot be secured by severing and sealing lines, a suitable closure capable of sealing and preventing unauthorized entry or removal will be installed. Methods of isolation will be designed to allow for access, if required, for future stabilization or retrieval efforts.

c. Provision of surveillance instrumentation to monitor single-shell waste storage tanks for pressure, the presence of combustible gas, the measurement of solid and liquid contents and to indicate movement or structural degradation of waste storage tank walls and domes. Additional dry wells will also be provided on the tank periphery where required. Fixed and mobile instrumentation will be utilized to monitor and record the parameters for tank surveillance. A bench mark will be affixed to tank domes for survey measurement of dome differential. Thermocouple trees will be installed in the interior of larger high temperature single-shell tanks. A riser on each tank will be modified to allow connection of a portable exhaust system to preclude releases to the environment when a tank flange is removed for inspection of instrumentation.

d. Upgrading of the 200 Areas cathodic protection system to protect the buried carbon and stainless steel pipelines and catch tanks against galvanic corrosion.

e. Expansion of the Computerized Automatic Surveillance System (CASS) by connecting remote alarms to CASS substations. This will centralize surveillance for the 200 Areas in the 2750-E, Waste Management Surveillance and Operations Facility.

f. Provision of/or modification to existing facilities, processes and/or structures, for improved handling and stabilization of a variety of wastes which are either being concentrated and stored in existing Hanford facilities or currently exists in adjoining areas. Such efforts would minimize the amount of waste which must be stored and stabilized, thus reducing the potential for releases to the environment. Through a combination of process improvements and new processes, wastes would be fixed for burial or lower cost storage.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

8. Brief physical description of project (cont'd)

Title I and partial Title II design is being performed with prior year plant engineering and design (PE&D) funds. The FY 1984 appropriation is required to continue construction.

9. Purpose, justification of need for, and scope of project

Purpose: The removal of all freestanding liquid from the 149 old single shell tanks at Hanford was completed in November 1980. Removal of the remaining pumpable liquid is scheduled to be completed in FY 1989. The purpose of this project is to maintain the old single shell tanks in a safe, stable condition by providing for their long-term isolation, surveillance, and corrosion protection.

Justification: This isolation effort will place the single shell waste storage tanks, related auxiliary facilities, and systems in a mode which will minimize the intrusion of liquids into these systems, thereby preventing the migration of radioactive materials from these tanks and/or containments. The surveillance instrumentation will provide increased monitoring capability for large single shell waste storage tanks until the decision to leave or retrieve the stored waste is made. Upgrading the 200 Areas cathodic protection system will provide protection against galvanic corrosion of buried pipelines, catch tanks and other equipment.

Scope: This project will provide such items as: (a) the facilities for the isolation of Hanford waste storage tank farms, (b) additional surveillance instrumentation for single shell waste storage tanks and related systems, and (c) additional protection for buried pipelines and single shell catch tanks against galvanic corrosion.

10. Details of cost estimate[a]

	Item Cost	Total Cost
a. Title II design services at 7% of construction costs, item c		$ 1,700
b. Title III services at 8% of construction costs, item c		1,900
c. Construction costs		24,650
(1) Construction will include modification of existing risers to incorporate a valve assembly that connects to breathing filters on the isolated tanks	$ 500	
(2) Special facilities including specialized pumps, piping, instrumentation, filter systems, job cranes, dry wells, caissions, and barriers	24,150	
Subtotal		28,250

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[a] Based on 70% complete conceptual design and recent construction costs of similar projects.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

10. Details of cost estimate

	Item Cost	Total Cost
d. Contingency @ approximately 22% of above costs		$ 6,200
Total Project Cost		$ 34,450

11. Method of performance

Title II design services will be performed by a negotiated architect/engineer contract. Title III services will be accomplished by the CPAF architect/engineering contractor. Construction and procurement will be accomplished by the onsite cost-plus-award fee construction services contractor or fixed-price contracts and subcontracts awarded competitively.

12. Schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	To Complete	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 826	$ 7,000	$ 7,000	$ 9,550	$ 7,000	$ 3,074	$34,450
(b) PE&D	1,550	0	0	0	0	0	1,550
Total facility costs	2,376	7,000	7,000	9,550	7,000	3,074	36,000
2. Other project costs							
(a) R&D necessary to complete construction	800	0	0	0	0	0	800
(b) Other project related cost	350	300	250	150	50	200	1,300
Total other project funding	1,150	300	250	150	50	200	2,100
Total project costs (item 1 & item 2)	$ 3,526	$ 7,300	$ 7,250	$ 9,700	$ 7,050	$ 3,274	$38,100

b. Other related annual costs	
1. Annual facility operating cost	$ 600
2. Programmatic operating expenses directly related to the facility	2,700
3. Capital equipment not related to construction but related to the operating effort in the facility	100
Total other related annual costs	$ 3,400

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D necessary to complete construction

The estimated conceptual design cost for this project is $950,000.

(b) Other project related costs

These costs are associated with project support and management activities.

b. Total related funding requirements

1. Annual facility operating costs

These costs include manpower, energy, maintenance and shop supplies for operation of facilities and processes.

2. Programmatic operating expenses directly related to the facility

These costs represent approximately one-half of the waste management operating costs for the Hanford waste management systems of which these facilities will be a part.

3. Capital equipment not related to construction but related to operating effort in the facility

These costs include a special purpose vehicle for transport of solidified waste.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

3. Date A-E work initiated: 4th Qtr. FY 1981

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 3rd Qtr. FY 1984

5. Previous cost estimate: $12,000
Date: 2/81

6. Current cost estimate: $12,100
Less amount for PE&D: 100
Net cost estimate: $12,000
Date: 1/82

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1982	$ 12,000	$ 3,000	$ 3,000	$ 128
1983	0	6,000	6,000	5,000
1984	0	3,000	3,000	4,000
1985	0	0	0	2,872

8. Brief physical description of project

This project will replace approximately 27 miles of deteriorated and substandard rail along with switch turnouts, frogs, plates, anchors, gauge rods and splice bars. An estimated 20 percent of the crossties in the area of the rail replacement will also be replaced.

This rail line connects the 1100 and 200 areas and is subjected to high usage with heavy loading; also the approaches from the northern 100 areas and west to the 200 East and 200 West areas; within the 200 East and 200 West areas where transport of radioactive materials is of prime concern, and within the 300 area to support new construction projects. Replacement rail will be of control-cooled quality and 115 pound (per yard) weight.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

8. Brief physical description of project (cont'd)

Design has been initiated using prior year plant engineering and design (PE&D) and capital funds. The FY 1984 appropriation is required to continue materials procurement and construction.

9. Purpose, justification of need for, and scope of project

Purpose: This project will eliminate serious safety hazards from the Hanford Railroad by replacing substandard rail with rail which meets requirements for a Class III Federal Railroad Administration-rated system.

Justification: The Hanford Rail System handles approximately 4,000 commercial (coal, chemicals, construction materials, etc.) moves and approximately 1,000 process-related (radioactive waste, irradiated fuel, etc.) moves per year. Its 134 miles of track serve the entire Hanford complex. It was constructed in the early 1940's with surplus rail. Additions to the system have also utilized reclaimed rail. This rail is not uniform and contains at least nine different weights of rail with different design configurations within each weight. The maintenance of the deteriorated rail system is costly and difficult. The FY 1984 budget for minimum maintenance requirements is $342,000.

Scope: This project will replace approximately 27 miles of substandard rail in the 134 mile Hanford railroad system. Procurement and construction have been split into three phases. The first phase expedites 200 East Area railroad upgrades essential to the startup of PUREX. Phases II and III will complete upgrades in the 200 W Area and the mainline to the 100 N Area where the N-reactor is located. Most old rail to be replaced is less than 85 pounds (per yard) in weight and was manufactured before 1936 when controlled cooling was not a standard of manufacture. Rail manufactured without controlled cooling is susceptible to internal fracturing and has caused many serious derailments in commercial use. A recent inspection by the Federal Railroad Administration resulted in a recommendation that rail older than 1936 and lighter than 90 pounds per yard be replaced. Their report indicated that a derailment was likely because of the deteriorated state of the system. A weekly inspection program and a continuing safety awareness program is conducted, and reduced speeds are enforced to minimize accident potential and consequences. Railroad tank cars which contain radioactive liquid waste and commercial liquid chemicals are routinely transported over the rail system and potential accidents involving these cars are now of major local and national concern.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

10. Details of cost estimate[a]

	Total Cost
a. Engineering design, and inspection at 4% of construction costs, item b	$ 420
b. Construction costs	10,600
Subtotal	11,020
c. Contingency @ approximately 8% of above costs	980
Total Project Cost	$ 12,000

11. Method of performance

Engineering design and inspection will be performed by the onsite Architect-Engineering contractor or by a negotiated contract with an offsite engineering-construction firm. Construction will be performed under fixed-price contract awarded on the basis of competitive bids, and contract administration will be provided by the onsite cost-plus-award-fee construction services contractor.

12. Funding schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item	$ 128	$ 5,000	$ 4,000	$ 2,872	$12,000
(b) PE&D	100	0	0	0	100
Total facility costs	228	5,000	4,000	2,872	12,100
2. Other project costs					
(a) R&D necessary to complete construction	10	0	0	0	10
(b) Other project-related cost	50	50	20	0	120
Total other project funding	60	50	20	0	130
Total project costs (item 1 & item 2)	$ 288	$ 5,050	$ 4,020	$ 2,872	$12,230

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[a] Based on a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

12. Funding schedule of project funding and other related funding requirements (cont'd)

b. Other related annual costs (estimated life of project: 40 years)

1. Facility operating costs	$ 232

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project costs

(a) R&D necessary to complete construction

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Radioactive waste facilities improvements, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

3. Date A-E work initiated: 1st Qtr. FY 1980 [a]

3a. Date physical construction starts: 4th Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $20,000
Date: 2/81

6. Current cost estimate: $22,300
Less amount for PE&D: 1,300
Net Cost estimate: $21,000 [b]
Date: 1/82

7. Financial schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1981	$ 20,000	$ 5,000	$ 5,000	$ 1,927
1982	0	7,000	7,000	3,701
1983	0	5,000	5,000	5,975
1984	1,000	4,000	4,000	5,290
1985	0	0	0	2,734
1986	0	0	0	1,373

8. Brief physical description of project

This project will provide new facilities, equipment replacement, and other improvements to the waste management systems at the Oak Ridge National Laboratory (ORNL). As currently conceived, the project will provide replacement and upgrading of ducts and related equipment for the main off-gas and cell ventilation system; a new building with an electronic data acquisition system to modernize the Waste Operations Control Center; and new flow measuring devices and support facilities to upgrade monitoring stations located at White Oak Creek, Melton Branch, and White Oak Dam.

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[a] Project design initiated in FY 1980 with PE&D funds.

[b] The increase of $1,000,000 in the project cost is due to a reduction of $3,000,000 in the FY 1982 appropriation which caused a delay of one year in project completion.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive waste facilities improvements, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

8. Brief physical description of project (cont'd)

The Off-Gas and Cell Ventilation System Improvements will provide for the replacement of ducts and miscellaneous other equipment connected to an existing 250 foot high exhaust stack, the relocation of service pipes and electrical conduits presently installed on the ducts, and the replacement of ductwork and other equipment in other areas of the ORNL complex. The ducts serve as collectors for cell ventilation in several buildings throughout the Laboratory. The air is moved by four large electric fans backed up by two steam-driven fans. This equipment has deteriorated, from corrosion, beyond economical repair and it will be replaced with corrosion-resistant materials to improve the life expectancy of the installation. One off-gas scrubber will be replaced and a deactivated electrostatic precipitator will be removed.

The Waste Operations Control Center (WOCC) includes the construction of a steel-framed and reinforced concrete building and a modern data acquisition system. The building will be centrally located in the ORNL complex near the tanks, process equipment, and stacks that require most of the monitoring capability. The WOCC will include a maintenance shop, instrumentation room, computer installation, and office space.

The Streamflow Monitoring and Control System Improvement will consist of the installation of new flow measuring devices and the modification of existing support facilities at monitoring stations located on White Oak Creek, Melton Branch, and White Oak Dam (designated Stations 3, 4, and 5, respectively). Flow measuring devices will be installed within new flow channels. Instrumentation at each station will be upgraded to provide automatic and continuous flow readings.

The FY 1984 appropriation will provide for engineering, equipment procurement, and continued construction.

9. Purpose, justification of need for, and scope of project

Purpose: To upgrade the waste monitoring and control facilities at the Oak Ridge National Laboratory, through the replacement of old and deteriorated equipment, in order to meet present standards for safety and efficiency. These facilities provide no new capabilities to process the stored waste.

Justification: The off-gas and cell ventilation system equipment and facilities are up to 30 years old and many units are in need of major replacement. The existing waste monitoring equipment is obsolete and ineffective, requires manual handling and analysis, and maintenance is excessive. New streamflow monitoring and control systems are needed to comply with DOE policy requiring reduction of off-site effluents to levels as low as reasonably achievable. The present streamflow monitoring systems are not capable of supplying the necessary data to monitor ORNL releases under all common hydrologic conditions.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive waste facilities improvements,
Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

9. Purpose, justification of need for, and scope of project (cont'd)

Justification continued - The Stream Flow Monitoring and the Off-Gas and Cell Ventilation System improvements must be located to monitor and control effluents. Selection of alternative sites would result in unacceptable costs associated with rerouting or extensive construction. The WOCC site was selected for its central location near the equipment being monitored. Renovation of the existing facility is unacceptable because the data acquisition system would have to be shut down during construction. Expansion of the existing facility is unacceptable due to crowding of the area and because of loss of the data acquisition system.

Scope: The Waste Operations Control Center will provide on-line data including radiation levels in process systems and the conditions of other operations. The system will be modernized to ensure rapid, reliable detection and analysis of waste conditions.

10. Details of cost estimate [a]

	Item Cost	Total Cost
a. Engineering, design and inspection at 33% of construction costs, item b	$	$ 4,260[b]
b. Construction costs		12,840
(1) Improvements to Land	375	
(2) Building construction	970	
(3) Special facilities	8,350	
(4) Outside utilities	1,520	
(5) Removal cost - less salvage	1,625	
Subtotal		17,100
c. Contingency @ approximately 23% of above costs		3,900
Total Project Cost		$21,000

11. Method of performance

Design and inspection will be based on a negotiated architect-engineer contract and by the operating contractor. Where feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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[a] Based on Title II design plus actual bid or contract prices where available.

[b] Excludes $1,300,000 of FY 1980 PE&D funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive waste facilities improvements,
Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

12. Funding schedule of project and other related funding requirements

	Prior yrs.	FY 1984	FY 1985	FY 1986	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item	$ 11,603	$ 5,290	$ 2,734	$ 1,373	$ 21,000
(b) PE&D	1,300	0	0	0	1,300
Total facility costs	12,903	5,290	2,734	1,373	22,300
2. Other project costs					
(a) Other project related costs	443	0	0	0	443
Total project funding (item 1 & item 2)	$ 13,346	$ 5,290	$ 2,734	$ 1,373	$ 22,743

b. Other related annual costs (estimated life of project: 30 years)

1. Facility operating costs ....$ 11

13. Narrative explanation of total project funding and other related funding requirements

a. Total related funding requirements

The design life of the structures included in this project will be 30 years.

1. Annual facility operating costs

The project consists of improvements, renovations, or replacement of existing facilities or equipment. There are no significant changes in the facility operating costs. An increase of about 125 horsepower in the Off-Gas and Cell Ventilation System electric fans will add about $16,000/year operating cost. This increase will be partially offset by a decrease in the maintenance cost for the scrubber estimated at $5,000/year.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Defense waste processing facility.
Savannah River, South Carolina

2. Project No. 81-T-105

3. Date A-E work initiated: 4th Qtr. FY 1979

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 3rd Qtr. FY 1989

5.	Previous cost estimate:	$986,965
	Less amount for PE&D:	16,965
	Net cost estimate:	$970,000
	Date: 1/82	
6.	Current cost estimate:	$926,965
	Less amount for PE&D:	16,965
	Net cost estimate:	$910,000a/
	Date: 12/82	

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
Prior Years b/	16,965	16,965	16,965	16,965
1982	20,000	20,000	20,000	12,655
1983	40,000 c/	40,000	40,000	40,000
1984	142,000	142,000	142,000	113,525
1985	258,000	258,000	258,000	230,000
1986	260,000	260,000	260,000	230,000
1987	135,000	135,000	135,000	200,000
1988	55,000	55,000	55,000	63,000
1989	-	-	-	20,820

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a/ The total estimated cost has been reduced due to design improvements and a reduction in projected escalation rates.
b/ Prior year funding appropriated as PE&D.
c/ Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

8. Brief physical description of project

The Defense Waste Processing Facility (DWPF) will solidify defense high-level radioactive waste at the Savannah River Plant (SRP) for temporary storage, transportation to, and disposal in a federal repository. This project will provide facilities to immobilize the high-level waste in borosilicate glass in steel canisters. The canisters will be stored on the SRP site in air cooled vaults until a federal repository is available. The DWPF will begin operation in FY 1989 and will process the waste backlog inventory over approximately 15 years. The facility will be built near the H Chemical Separations Area and will include the waste processing facilities, waste storage building, and power, service and other support facilities.

The main process building will be seismic and tornado resistant and will include a remotely operated and maintained process cell containing process vessels and equipment which will be interconnected through systems of piping. The concrete walls will provide shielding against the highly radioactive waste solutions and solids. Cold feed chemicals and service systems, e.g., instrument connections, cooling water, steam, electrical power, etc., will be provided from adjacent areas behind the shielding walls to protect operating personnel. Ventilation air will be passed through a filter before final monitoring and discharge to the atmosphere. Also provided within the main process building will be maintenance shops and areas, control rooms and similar service locations. New facilities and supporting services such as electrical substations, water wells, sanitary sewer systems, roads, shops and an administration building will be provided as needed.

The near-surface vault will provide safe storage for the radioactive waste in canisters. It will be cooled by natural convection and require minimum surveillance and attention. Although it is intended to store waste in this vault for only a relatively short time there is no technically imposed time limit for this mode of storage. The waste form and storage canisters will be compatible with transportation to, and storage in, a waste repository. If the waste repository is not available on a schedule to meet DWPF production output, additional storage space can be added.

9. Purpose, justification of need for, and scope of project

Purpose: The Defense Waste Processing Facility (DWPF) will immobilize defense high-level radioactive waste at the Savannah River Plant (SRP) for disposal in a geologic repository.

Justification: Liquid high-level radioactive waste results from processing irradiated reactor fuel at the Savannah River Plant to produce nuclear materials for national defense. Approximately 28 million gallons of high-level waste have accumulated from past production operations, and an additional five to ten million gallons will be generated

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

9. Purpose, justification of need for, and scope of project (cont'd)

through the year 2000. The waste is stored in large underground tanks which have a limited life and must be replaced periodically. This interim storage mode requires active maintenance, surveillance, and other operations to minimize releases of radioactive material to the environment. The DWPF will immobilize waste as a stable solid. This immobilization, and confinement in a geologic repository, will ensure the long-term isolation of the waste from the environment with minimal maintenance and surveillance.

The DWPF will provide immobilized defense high-level waste for experiments in the WIPP in 1990. No other source of immobilized defense high-level waste will be available then.

Scope: This project will provide facilities which will perform the following operations remotely:
a. Transfer the treated high level waste from waste storage tanks to feed tanks in the main processing building.
b. Process the waste to produce canisters of waste immobilized in borosilicate glass.
c. Store the filled containers in a near-surface vault pending transfer to a waste repository.

The FY 1984 funding is required to continue design and begin construction. The FY 1984 funding has been reduced from that identified in the FY 1983 Congressional data sheet by reducing project flexibility, limiting procurement to critical path items, and minimizing FY 1984 contract commitments.

10. Details of cost estimate

	Item Cost	Total Cost
a. Engineering, design and inspection		$ 192,000
(1) Engineering and design at 31% of construction costs (item b)	154,170	
(2) Engineering control and inspection at 7% of construction costs (item b)	37,830	
b. Construction costs		500,000
(1) Improvements to land	9,000	
(2) Buildings	190,000	
(3) Other structures such as fan house, exhaust stack and sand filter	33,000	
(4) Special facilities such as piping processing equipment, mechanical systems and services	236,000	
(5) ADP equipment	2,000	
(6) Utilities	30,000	
c. Standard equipment		36,000
Subtotal		728,000
d. Contingency @ approximately 25% of above costs		182,000
Total Project Cost		$ 910,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility,
Savannah River, South Carolina

2. Project No. 81-T-105

11. Method of performance

Independent engineering contractors will be used for selected tasks under the supervision of the operating contractor.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Total
a. Total project funding									
1. Total facility costs									
(a) Const. line item.	$12,655	$40,000	$113,525	$230,000	$230,000	$200,000	$ 63,000	$ 20,820	$ 910,000
(b) PE&D............	16,965	0	0	0	0	0	0	0	16,965
Total fac. costs	29,620	40,000	113,525	230,000	230,000	200,000	63,000	20,820	926,965
2. Other project funding									
(a) R&D.............	83,548	14,869	17,200	16,800	13,400	11,000	5,000	5,000	166,817
DWPF Tech Support	0	0	3,934	12,000	12,000	12,000	14,500	12,000	66,434
(b) Other proj. related costs....	31,522	4,925	10,200	12,700	15,000	27,500	43,300	45,000	190,147
Total other proj. funding..	115,070	19,794	31,334	41,500	40,400	50,500	62,800	62,000	423,398
Total proj. funding (1&2)	$144,690	$59,794	$144,859	$271,500	$270,400	$250,500	$125,800	$ 82,820	$1,350,363

b. Other related annual costs (estimated programmatic use of facilities: 30 years).

1. Annual facility operating costs..	$60,000
2. Capital equipment not related to construction but related to programmatic effort in the facility.............	6,000
Total other related annual funding requirements (1989 dollars)..............	$66,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility,
Savannah River, South Carolina

2. Project No. 81-T-105

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D

These funds are required for optimization studies and completion of development and demonstration of the process.

DWPF Technical Support

These funds will provide technical support to construction during equipment testing and run-in.

(b) Other project related costs

Funds are for engineering studies, plant liaison costs for drawing review, and coordination of development data and design, construction checking, system testing, preparation of operating procedures, and training of the operating personnel.

b. Other related annual costs

1. Annual facility operating costs

Includes labor, overhead, utilities and services, process improvement development, cold feed chemicals, canister materials, and miscellaneous supplies.

2. Capital equipment not related to construction but related to programmatic effort in the facility

Includes estimated replacement costs for melter, vessels, pumps, motors, etc.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico	2. Project No. 77-13-f
3. Date A-E work initiated: 2nd Qtr. FY 1978	5. Previous cost estimate: $651,700[a/] Date: 12/81
3a. Date physical construction starts: Exploratory construction - 3rd Qtr. FY 1981 Facility construction - 2nd Qtr. FY 1983	6. Current cost estimate: $504,000[b/] Less amount for PE&D: 0 Net cost estimate: $504,000 Date: 5/82
4. Date construction ends: 1st Qtr. FY 1988[b/]	

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1977	$ 6,000	$ 6,000	$ 916	$ 854
1978	22,000	22,000	11,799	4,122
1979	40,000	18,000[c/]	28,933	32,607
1980	22,000	22,000	17,255	17,835
1981	29,000	15,000	23,969	20,881
1982	38,600	40,000	40,003	31,415
1983	76,200[d/][f/]	110,800[e/][f/]	60,925	45,800
1984	59,300[f/]	59,300[f/]	109,300	86,100
Future Years	210,900	210,900	210,900	264,386

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a/ DOE approved baseline.
b/ Estimated cost and schedule based on receiving Administrative Land Withdrawal from Department of Interior by July 1983. Also assumes full restoration of proposed funding reductions identified in footnotes e/ and f/.
c/ Includes $8,000,000 reprogramming action.
d/ Based on Public Law 97-377, Title I, Further Continuing Appropriations Act, 1983.
e/ Includes $50,000,000 proposed for deferral until FY 1984 due to possible delays in Administrative Land Withdrawal.
f/ If Administrative Land Withdrawal is received by July 1983, an amendment of approximately $50 million will be submitted.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

8. Brief physical description of project

The Waste Isolation Pilot Plant (WIPP), in Eddy County about 25 miles east of Carlsbad, New Mexico, will be a research and development (R&D) facility to demonstrate the safe disposal of radioactive wastes from defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission. As provided in the Record of Decision, construction of surface and underground facilities is proceeding on a phased basis consistent with the evaluation of data obtained during the exploratory Site and Preliminary Design Validation Program (SPDV). SPDV is an exploration program designed to validate site suitability, and to confirm preliminary geotechnical design parameters.

Land, Oil, Gas, and Mineral Rights

The actual Waste Isolation Pilot Plant site consists of 16 square miles of State and Federally-owned land. All federal and state lands including all surface and subsurface (oil, gas, water, and minerals) resources are being acquired. Partial control over federal lands has been transferred administratively from the Department of the Interior to the DOE by Public Land Order NM-43012, Dated March 23, 1982. A new administrative land withdrawal request is in process to provide authority to construct permanent WIPP facilities. Permanent withdrawal from the public domain by specific legislation will be required prior to emplacement of radioactive waste. Outstanding mineral and hydrocarbon interests will be acquired by purchase or condemnation to protect the integrity of the geologic formation. State lands totaling 1,740 acres will be traded for federal land of equal value.

9. Purpose, justification of need for, and scope of project

Purpose: This project is necessary to demonstrate for the first time the long-term disposal of defense-generated radioactive waste in a geologic environment on a credible scale. It will demonstrate safe routine handling of radioactive wastes in the quantities in which they are generated.

Justification: Radioactive waste disposal R&D activities have been under development by the Department of Energy and its predecessor agencies for decades. Some radioactive wastes require isolation from the biosphere for hundreds of thousands of years. Salt deposits such as those found at the WIPP site, have been isolated from circulating ground water (and thus from man's biosphere) for hundreds of millions of years. From an extensive site characterization and validation program, there is therefore good assurance that this isolation will continue. Radioactive waste placed in the WIPP salt beds can be expected to remain permanently isolated from man's environment. The WIPP site has been, and is now being, exhaustively studied to ensure a high confidence in the suitability of salt for waste disposal.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

9. Purpose, justification of need for, and scope of project (cont'd)

Scope: The WIPP facility will include permanent structures on the surface for waste handling, administration, operations, security, maintenance, and other support. There will be approximately six miles of roads and eight miles of railroad. Also included are site work, paving, fencing, and utilities. There will be one storage horizon located approximately 2,149 feet below the surface in the lower segment of the Salado (bedded salt) formation, shafts (waste, ventilation, and construction exhaust and salt handling) will connect the surface facilities to the storage horizon. Approximately 1,500,000 tons of salt excavation will be required to permit the initial receipt of wastes and experiments.

The waste handling facility will have the capability to handle annually up to 500,000 cubic feet of contact-handled waste and 400 containers of remote-handled waste on a single shift basis. Approximately 40-60 canisters (total) of experimental HLW will be emplaced and later removed after the experimental period. The full design capability of the WIPP for TRU waste will be utilized when sufficient operating and scientific data have been evaluated to assure the safety of short and long term disposal operations. The waste handling facility will include three major functional areas: a contact-handled waste area, a remote-handled waste area, and the waste hoist tower. The contact-handled waste area includes facilities for receiving and handling, pallet loading and overpack and repair. The remote-handled waste area includes facilities for cask receiving, preparation, and decontamination and a hot cell for canister removal, as well as appropriate transfer stations and airlocks. Both the contact-handled and remote-handled areas share the shaft for transport of the waste underground. Associated administrative, laboratory, change rooms, utility and electrical equipment areas adjoin the main facility.

The project includes offices and facilities for security, fire safety, plant safety, first-aid, inventory, health physics, monitoring, data processing, and control rooms. These facilities will be located in the support area of the Waste Handling and Support Building. Other support facilities include hoist houses, exhaust filtering, salt handling, emergency power, and warehousing. Land improvements will include clearing and grading, roads, parking areas, and fencing. This remote site also requires road and rail access, water, and telephone connections, etc.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste Isolation Pilot Plant, Delaware Basin, Southeast, New Mexico 2. Project No 77-13-f

10. Details of cost estimate

A comprehensive preliminary design (Title I) review of the WIPP project was conducted in June 1979. A total estimated cost (TEC) of $440,500,000 was established and approved in September 1979. This estimate was based upon completion construction in CY 1984. Since that time, numerous delays have been experienced: Title II was not started until February 1981 and continued at a minimal pace through FY 1982; and the scheduled completion has slipped to 1987. The scope of the project has been modified to exclude commercial spent fuel and to include an exploratory program (the SPDV). A revised TEC of $651.7 million was reviewed and validated in December 1981. The increase from the previous estimate resulted almost exclusively from delay and escalation. A cost reduction program has now identified significant savings which are reflected in the estimate of $504 million for the project.

11. Method of performance

Design will be by a cost-plus-fixed-fee A-E contract for Title II and Title III. Construction will be by fixed price contracts awarded competitively. If fixed price contracts cannot be awarded effectively, cost-plus-award-fee contracts will be employed. The technical support contractor will be responsible for procurement of certain material and equipment. Site acquisition will be accomplished through the withdrawal of federal lands from the public domain. The U.S. Army Corps of Engineers has been assigned responsibility, under DOE Project Office direction, for construction management and construction contractors.

12. Funding schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	Future Years	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item[a]	$ 107,714	$ 45,800	$ 86,100	$ 264,386	$504,000
2. Other project costs					
(a) R&D (conceptual design, site evaluation)	56,124	14,000	20,800	148,676	239,600

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[a] This cost includes leasehold acquisition costs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

12. Funding schedule of project funding and other related funding requirements (cont'd)

	Prior yrs.	FY 1983	FY 1984	Future Years	Total
(b) Other project related costs (capital equipment)	$ 1,187	$ 600	$ 600	$ 2,013	$ 4,400
Total other project costs ...	57,311	14,600	21,400	150,689	244,000
Total project costs (item 1 & item 2)	$ 165,025	$ 60,400	$ 107,500	$ 415,075	$ 748,000

b. Total related funding requirements (estimated life of project: 25 years)

1. Annual facility operating costs (1982 Dollars) $20,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D necessary to confirm site suitability and complete construction

These funds are (1) R&D directly supporting design, construction and future operations and (2) validation of site suitability, including underground exploration and measurements. They include support for USGS activities, and support to the State of New Mexico for independent environmental, health, and safety review.

(b) Other project related costs

These funds are for equipment requirements to support the R&D program.

b. Total related funding requirements

1. Facility operating costs

These costs represent the project annual operating cost for the facility.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Defense Programs

Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars, in thousands. Narrative material in whole dollars.)

Processing Experimental Pilot Plant
Idaho Operations Office

Total Estimated Cost (TEC) $20,900,000
(For Design and Construction)

Processing Experiment Pilot Plant
Idaho Operations Office

Total Estimated Cost (TEC) $20,900,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years		FY 1983 Estimate		FY 1984 Estimate		FY 1985 Estimate		FY 1986 Estimate		
	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	Total
Operating Expenses (DOE):											
Design and Construction	$ 0	$ 0	$ 4,300	$ 4,300	$ 5,200	$ 3,900	$11,400	$10,000	$ 0	$ 2,700	$20,900
R&D Related to Construction .. .	1,200	1,200	1,200	1,200	1,500	1,100	1,000	1,000	1,000	1,400	5,900
Facility Operations	0	0	0	0	0	0	0	0	0	0	0
Direct Project Related Support Costs	0	0	0	0	0	0	0	0	2,700	2,700	2,700
Capital Equipment	0	0	0	0	0	0	0	0	0	0	0
Total Operating Expenses	1,200	1,200	5,500	5,500	6,700	5,000	12,400	11,000	3,700	6,800	29,500
Other DOE Costs	0	0	0	0	0	0	0	0	0	0	0
Total DOE Costs	1,200	1,200	5,500	5,500	6,700	5,000	12,400	11,000	3,700	6,800	29,500
Non-DOE Costs	0	0	0	0	0	0	0	0	0	0	0
TOTAL PROJECT COSTS	$ 1,200	$ 1,200	$ 5,500	$ 5,500	$ 6,700	$ 5,000	$12,400	$11,000	$ 3,700	$ 6,800	$29,500

Processing Experiment Pilot Plant
Idaho Operations Office

Total Estimated Cost (TEC) $20,900,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, objective, and justification

The PREPP will operate as an experimental pilot plant to obtain design and operational data for a full-scale Transuranic Waste Treatment Facility (TWTF) to be located at either the Idaho National Engineering Laboratory (INEL) or some other location. The PREPP will include several unit processes (experimental equipment) which will demonstrate different experimental approaches to processing TRU waste. The initial experiments conducted in the PREPP will process selected retrievably stored INEL TRU waste which cannot be certified for direct shipment to WIPP. This waste will consist of shreddable solid wastes and sludges contained in 30, 55, and 83 gallon steel drums; 4 x 4 x 7 foot wooden boxes; and 4 x 5 x 6 foot steel bins. Containers suspected of containing large unshreddable items, hazardous materials, nonradiological toxic chemicals, large quantities of lead, highly radioacive material, and lead-lined drums will not be processed, but will continue to be stored at the Radioactive Waste Management Complex (RWMC) until the full-scale TWTF is available.

The PREPP will process the selected stored TRU waste material through a low speed shredder and rotary kiln incinerator. Unshreddable items which were not identified at the RWMC will be removed from the shredder, and, if practical, returned to the process downstream of the shredder. Any items which are incompatible with the process or will not fit into the end product container will be repackaged and returned to the RWMC for interim storage until the full-scale TWTF is available. The incinerator discharge material will be immobilized by concreting. The PREPP will be designed to test processing of the selected TRU stored waste at a nominal rate of ten tons per day. All auxiliary equipment will be sized to support this process rate and reasonable rate changes due to anticipated fluctuations in equipment loading due to changes in the types of waste being processed. The PREPP will also provide space for installation of additional equipment to evaluate additional methods of waste handling and immobilization.

The primary objective of the PREPP is to demonstrate, through experiments, the viability of full-scale methods for processing transuranic (TRU) waste into a form acceptable for disposal at the Waste Isolation Pilot Plant (WIPP).

The TRU waste put into retrievable storage early in the program has passed the half way mark of its 20 year design life. There is a fast approaching need to develop technologies to treat this waste for permanent disposal. The PREPP experiments will develop the needed technologies.

a. Schedule of planned activities:

	Start	Complete
Engineering Design (Title I and II)	1Q FY 1983	4Q FY 1983
Procurement	3Q FY 1983	4Q FY 1985
Construction and Installation	1Q FY 1984	4Q FY 1985
Check-out and Start-up	1Q FY 1986	4Q FY 1986
Experimental Program*	1Q FY 1987	4Q FY 1989

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* Costs are not included in this Schedule 47.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Nuclear Safeguards and Security
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Approp.	FY 1983 Approp.	FY 1984 Base	FY 1984 Request
Nuclear Safeguards and Security (DP)				
Nuclear Safeguards and Security				
Operating Expenses	$37,981	$37,310	$37,310	$41,650
Capital Equipment	3,700	3,700	3,700	4,000
Construction	0	500	500	0
Subtotal	$41,681	$41,510	$41,510	$45,650
Program Direction				
Operating Expenses	5,538	5,850	5,850	6,350
Subtotal	5,538	5,850	5,850	6,350
Total				
Operating Expenses	$43,519	$43,160	$43,160	$48,000
Capital Equipment	3,700	3,700	3,700	4,000
Construction	0	500	500	0
Nuclear Safeguards and Security	$47,219	$47,360	$47,360	$52,000
Staffing FTP/FTE's	185/189	189/193	189/193	196/200

Authorization: Section 1, P.L. 83-703

Summary of Changes

FY 1983 Appropriation	$47,360
Built-in increases and decreases	0
FY 1984 Base	$47,360
Program increases and decreases:	
Support additional emphasis on field implementation of safeguards and security upgrades and improvements, and continue safeguards and security operations	+4,004
Technology	+891
Reduce efforts in international support	-955
Provide timely and consistent classification guidance through an information retrieval system	+400
Provide Personal Services-Lump sum payments on retirements, within grades and increased benefits	+500
Provide equipment for safeguards improvements	+300
Construction	-500
FY 1984 Budget Request	$52,000

The FY 1984 budget request for the Nuclear Safeguards and Security Program is $52,000,000, an increase of $4,640,000 over the amount appropriated in FY 1983. The details of this budget increase are provided in the subsequent discussions of planned program efforts.

The Nuclear Safeguards and Security Program is responsible for developing measures to assure adequate protection of the Department's nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage. The program also focuses on providing safeguards technical support to U.S. and international activities designed to minimize the proliferation of nuclear weapons. For FY 1984 the Nuclear Safeguards and Security Program consists of four basic elements. These are (a) Safeguards and Security Operations, (b) Technology, (c) International, and (d) Classification.

Nuclear Safeguards and Security

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses - Program Resources.............	$37,310	$41,650
- Program Direction.............	5,850	6,350
Capital Equipment..................................	3,700	4,000
Construction.......................................	500	0
	$47,360	$52,000

Operating Expenses - Program Resources

The FY 1984 budget request for program-related operating expenses is an increase of $4,340,000 above the comparable budget authority available for FY 1983.

Safeguards and Security Operations

The FY 1984 operating expense request is $25,440,000 for Safeguards and Security Operations, an increase of approximately $4,000,000 over FY 1983. This provides for enhancement of the DOE's capability to protect classified information, weapons, facilities, special nuclear materials, and provides technical assistance to field offices and DOE contractors for cost-effective application of safeguards and security technology and systems in support of programs involving existing and new facilities, and the conduct of training and workshops. In addition, it provides support to an effective Material Control and Accountability (MC&A) operation, including the Nuclear Materials Management and Safeguards System (NMMSS)--the National Data Base for information on all nuclear materials. It also provides safeguards laboratory (New Brunswick Laboratory) analytical services for DOE, the Nuclear Regulatory Commission (NRC) and the International Atomic Energy Agency (IAEA); and other developmental activities associated with improved field safeguards and security operations.

Techniques will be developed to better understand how to minimize the consequences of a successful malevolent intrusion should one occur. Information on adversary activities will be analyzed and distributed to program and field offices in order to identify trends and patterns. Those facilities for which the combined threat, vulnerability and consequences are potentially highest will be identified in order to better utilize resources. Oversight activities which involve periodic inspections and reviews of major DOE locations to evaluate safeguards and security programs will be continued.

Of the $25,440,000 budget request, approximately $4.1 million is required to support additional emphasis on field implementation of safeguards and security upgrades through the Safeguards and Security Improvement Program. A major effort is required to assure that the technology developed to date in the Nuclear Safeguards and Security Program is transferred to the field and incorporated into safeguards and security upgrades. This field assistance will be a primary objective of Safeguards and Security Operations in order to provide expert technical assistance to field operations for cost-effective application of safeguards and security technology developed in prior years. The emphasis is designed to correct recognized vulnerabilities at DOE sites and support requirements to upgrade safeguards and security.

Continued emphasis is aimed at ensuring the effectiveness of security at DOE facilities through improvements in protective force training; analyses, dissemination and utilization of intelligence information for security purposes; improved classified computer security operations; and more stringent control of classified information.

During FY 1984, the Office of Safeguards and Security (OSS) will continue to fund critical tasks aimed at improving the DOE's protective force capabilities. Improved guard force training and testing techniques developed in FY 1983 will be implemented and evaluated. The Multiple Integrated Laser Engagement System (MILES) will continue to be used as an aid in providing maximum realism in tactical training of guard forces. The MILES weapon is a standard weapon modified to shoot harmless laser beams instead of ammunition. MILES equipment loans to all DOE protective force units will be continued and will serve as a tool in the performance testing and effectiveness evaluation of security force protective personnel.

OSS will continue to provide DOE field elements with timely intelligence information relative to the current and changing threats to the security posture of the Department. This effort will include (1) operational security vulnerability assessments to determine the potential for hostile intelligence collection against classified programs; (2) the development of advanced audio countersurveillance and suppression technology in support of Intelligence Community technical security operations; (3) continuation of developmental activities for improved protection of classified computer security operations in the DOE's computer systems and telecommunication system; (4) the transfer of improvements in technology in these areas to field operations; and (5) the development of security education and awareness training aids for field use.

OSS will continue to support the capability established in prior years to perform comprehensive technical and psychological threat credibility assessments. These communications analyses of actual threats by a team of highly skilled laboratory analysts serves as a national asset to the DOE's Emergency Action Coordination Team (EACT), the Federal Bureau of Investigation (FBI) and the Nuclear Regulatory Commission (NRC). This capability will also be utilized in support of other appropriate Federal, state and local law enforcement agencies through the FBI.

Funds are provided for continued operation of the Nuclear Materials Management and Safeguards System to track all nuclear materials in the U.S. Annually, approximately 700,000 nuclear material transactions (e.g., shipments, receipts, inventory changes) from 130 contractors and 1,400 licensees are entered into the system.

The New Brunswick Laboratory (NBL) serves as the U.S. government safeguards analytical laboratory to provide materials and services to DOE, NRC, and other government agencies, commercial industry and foreign organizations in fulfilling safeguards requirements essential for the control and accountability over nuclear materials and related materials. This includes (1) developing new and improved chemical and instrument measurement methods, (2) providing measurement services in support of Government audit and inspection requirements, (3) assessing and evaluating measurement technology in support of DOE fuel cycle and weapons production activities, (4) developing, certifying and distributing reference materials for calibration and standardization of materials measurements, and (5) assisting in technology exchange and training in measurement technology.

Technology

The FY 1984 operating expense request is $10,090,000 for Technology. This is an increase of approximately $891,000 above FY 1983. This activity provides a base of technology to be used for safeguarding DOE and other U.S. nuclear facilities and includes a base level testing capability for new or modified commercial products (i.e., exterior sensors, interior sensors) and for determining and specifying assessment capabilities and strategies for response. It also includes the development and testing of new technology, components and systems for entry control, intrusion detection, explosives detection, use-denial, detection-surveillance-assessment for airborne threats and advances in security systems to determine effectiveness against new or changing threats. Tests and evaluations will be conducted on automated and hands-off components interfaced with computers to assay nuclear material for timely and accurate use of analytical measurement data for safeguards implementation. Emphasis will be placed on closing material balances on a more quantitative and timely basis. Field demonstrations will be conducted on techniques that can be used nondestructively and remotely and thus contribute to safe operations and provide efficient measurements for highly irradiated reprocessing dissolver solutions at Idaho, Richland and Savannah River. A minimum level of support will be maintained for highly accurate calorimetric and gamma spectrometry measurements and for bulk materials measurements, standard reference materials and quality assurance programs; and development and testing of new technology, components and systems for nuclear materials measurements and accounting to determine effectiveness for expected new DOE processes and fuel cycle materials. Activities include vulnerability analysis, generic system design, integration of physical protection and materials control and accountability, assessment and transportation safeguards.

International

The FY 1984 operating expense request is $4,970,000 for International. This is a decrease of approximately $955,000 below the FY 1983 level. The reduced level will permit continuation of only the highest priority efforts in this area, with the primary objective to strengthen international safeguards in support of U.S. nonproliferation and national security. Substantial effort is directed at development of safeguards for application in 1984 at the Portsmouth Gas Centrifuge Enrichment Plant (GCEP) under the December 1980 safeguards treaty-agreement with the IAEA. This effort includes prototype and on-site testing of the selected safeguards equipment and system. Safeguards also will be developed for IAEA use at large nuclear fuel cycle facilities, including reprocessing, mixed-oxide fuel fabrication and nuclear power plants using plutonium fuel in the U.S. and overseas. Training is provided for foreign safeguards personnel as directed by the Nuclear Nonproliferation Act of 1978.

Compliance with international agreements and the Atomic Energy Act of 1954, as amended, requires the tracking of both U.S. materials exported overseas and materials of foreign origin in the U.S. Funds are provided for the tracking of U.S. nuclear material in 50 countries, tracking and reporting to the IAEA under the U.S./IAEA Safeguards Treaty, and determining inventories of nuclear materials for Bilateral Agreements.

Classification

The FY 1984 operating expense request is $1,150,000 for Classification. This is an increase of approximately $400,000 above FY 1983. This request provides for technical programmatic support activities (e.g., technical studies for such areas as Inertial Confinement Fusion, advanced weapons system, advanced isotope separation; technical support for guide preparation, expanded reviews, etc.). The increase of $400,000 over FY 1983 is to continue efforts on the establishment of an automated information retrieval system to provide for timely and consistent classification guidance, ready access to key precedent decisions, more efficient responses to the Congress and the public, and a comprehensive data base of public disclosures of classified information to properly assess privately generated nuclear weapon designs.

The objectives of the program are to estabiish and implement policy for the classification of Restricted Data, Formerly Restricted Data, and National Security Information within DOE's jurisdiction in accordance with the requirements of the Atomic Energy Act of 1954, as amended, and applicable Executive Orders. The program must also assure the continuous review of Restricted Data in order for the Assistant Secretary for Defense Programs to determine what may be declassified and disseminated in the interest of scientific and technical program and the general public welfare, without damage to the national security.

Specifically, the program (1) provides continuing guidance and oversight to Headquarters and field organizations on classification and declassification policies and procedures; (2) develops and updates classification guidance for nuclear weapons and other classified areas; (3) handles classification and declassification reviews, such as Freedom of Information Act requests and Mandatory Review requests pursuant to Executive Order 12356; and (4) performs appraisals of Headquarters, field office, and contractor classification functions.

Plant and Capital Equipment

	FY 1983 Appropriation	FY 1984 Request
Capital Equipment................................	$3,700	$4,000
Construction.....................................	500	0
Total Plant and Capital Equipment.............	$4,200	$4,000

The FY 1984 budget request for Capital Equipment is $4,000,000, a modest $300,000 increase over FY 1983. Equipment is provided in direct support of the work discussed. Capital Equipment will be provided for: direct field support of DOE programs, operation of the Nuclear Materials Management and Safeguards System, operation of the New Brunswick Laboratory, nuclear material measurement and analysis for international and domestic safeguards, security countermeasures and computer security test and evaluation, and physical security for domestic safeguards. The additional $300,000 will be used to support increased emphasis in the Safeguards and Security Operations upgrade and improvement activities.

Operating Expenses - Program Direction

	FY 1983 Appropriation	FY 1984 Request
Program Direction................................	$5,850	$6,350

The FY 1984 budget request is $500,000 above the FY 1983 amount. The program direction funds provide for the salaries, benefits and travel expenses for 142 full-time and 4 other than full-time equivalent positions associated with operational and management responsibilities of the safeguards and security and classification programs. The increase in FY 1984 funding includes higher lump sum payments for unused annual leave and within grade increases.

The safeguards and security staff are charged with the following major programmatic areas of responsibility.

o Policy development and implementation, long-range planning, follow-up action on the resolution of identified site deficiencies, and resource management activities of the Office of Safeguards and Security.

o Oversight assessment of the effectiveness and implementation of safeguards and security policy as it relates to the protection of nuclear-related DOE responsibilities and other designated DOE activities.

o Operational aspects of personnel clearance procedures, actions and policy as well as the management of the DOE's personnel security clearance program involving the processing and analysis of approximately 27,000 security investigations per year.

o Direction and coordination of Agency-wide physical, technical, computer and operational security programs as well as document control and protective personnel programs.

o Direction of the technology activities in physical protection and material control and accountability, for international safeguards, and for operational aspects of nuclear material control and accountability.

o Management of the United States "Program of Technical Assistance to International Atomic Energy Agency Safeguards", a reimbursable work program funded at more than $4,000,000 per year from Department of State appropriated funds.

The classification staff is charged with the following major areas of responsibility.

o Technical direction and management of the Classification Program; development, issuance and monitoring of classification guides, bulletins, policies and procedures; classification reviews of documents and materials for the public (e.g., Freedom of Information Act and Mandatory Review Requests), other Agency elements, other Federal agencies, and foreign governments; classification support for Congressional activities (testimony and review); development and implementation of a classification education program; development and maintenance of data management systems on classification reviews, guides and authorized classifiers.

The nature of the activities supported in this budget do not lend themselves to the traditional cost-benefit analysis. However, activities are conducted in a manner to assure the most effective and efficient use of program resources.

In summary, the FY 1984 budget request for Nuclear Safeguards and Security activities is $52,000,000, which provides $49,500,000 for the Nuclear Safeguards and Security Program and $2,500,000 for the Classification Program.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Security Investigations
Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Approp.	FY 1983 Approp.	FY 1984 Base	FY 1984 Request
Security Investigations (DP)				
Operating Expenses..............	$23,600	$28,500	$32,140	$29,500
Security Investigations...........	$23,600	$28,500	$32,140	$29,500
Staffing FTP/FTE's................	N/A	N/A	N/A	N/A

Authorization: Section 145, P.L. 83-703

Summary of Changes

FY 1983 Appropriation..	$28,500
Built in increases and decreases:	
Increased cost per investigation.................................	+3,640
FY 1984 base..	$32,140
Program increases and decreases:	
Decrease in Full Field Investigations (approximately 1,500)......	-2,640
FY 1984 Budget Request..	$29,500

The objective of the Security Investigations Program is to insure that the common defense and security of the United States is protected by an adequate background investigation and screening of those DOE and DOE contractor personnel who would, in the performance of their work, need access to Restricted Data, National Security Information or Special Nuclear Material, or who would occupy a designated Critical Sensitive position. The Office of Safeguards and Security is responsible for this activity.

The FY 1984 budget request for the Security Investigations Program is $29,500,000, an increase of $1,000,000 over the FY 1983 appropriation. This amount will provide DOE with approximately 27,300 security investigations (16,700 full field background investigations and 10,600 National Agency checks). The estimated cost for a Federal Bureau of Investigation full field background investigation increases from an estimated $1,650 in FY 1983 to $1,850 in FY 1984, and for an Office of Personnel Management investigation from $1,550 in FY 1983 to $1,750 in FY 1984. The $29,500,000 should adequately support projected FY 1984 requirements for all DOE and DOE contractor personnel requiring security clearances.

A tabulation of the programmatic areas that are supported and the FY 1983 and FY 1984 funding levels follow:

	FY 1983		FY 1984	
	Cases	Amount	Cases	Amount
Programs				
Defense Program activities	20,030	$19,507	19,137	$20,428
Other DOE activities				
Uranium enrichment	5,195	5,481	5,272	5,899
Nuclear energy	1,965	1,542	1,067	1,015
Other	1,812	1,970	1,824	2,158
Total other DOE	8,972	8,993	8,163	9,072
Total	29,002	$28,500	27,300	$29,500

Below is a summary tabulation of security clearance requirements for FY 1983 and FY 1984 by type of clearance.

	FY 1983		FY 1984	
	Full Field	NAC	Full Field	NAC
Programs				
Defense Program activities	12,487	7,543	11,587	7,550
Other DOE activities				
Uranium enrichment	3,522	1,673	3,356	1,916
Nuclear energy	980	985	573	494
Other	1,213	599	1,184	640
Total other DOE	5,715	3,257	5,113	3,050
Total	18,202	10,800	16,700	10,600

The Atomic Energy Act of 1954, as amended, and Executive Orders 10450 and 10865 require that background investigations be conducted on all persons prior to being granted access to classified information, material, facilities or special nuclear material. Such investigations must be conducted by either the Federal Bureau of Investigation, or the Office of Personnel Management.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Naval Reactors Development

Nuclear Energy
Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Naval Reactors Development (NE)				
Plant Development				
Operating Expenses...........	$ 54,000	$ 58,000	$ 58,000	$ 59,000
Subtotal....................	54,000	58,000	58,000	59,000
Reactor Development				
Operating Expenses...........	125,700	157,150	157,150	188,800
Capital Equipment............	28,000	11,000	11,000	20,000
Construction.................	54,000	78,000	78,000	103,000
Subtotal....................	207,700	246,150	246,150	311,800
Reactor Operation & Evaluation				
Operating Expenses...........	88,000	104,100	104,100	112,000
Subtotal....................	88,000	104,100	104,100	112,000
Enriched Material[1]				
Operating Expenses...........	136,800	109,000	109,000	120,000
Subtotal....................	136,800	109,000	109,000	120,000
Program Direction				
Operating Expenses...........	9,420	9,660	10,200	10,200
Subtotal....................	9,420	9,660	10,200	10,200
Total				
Operating Expenses.............	413,920	437,910	437,910	490,000
Capital Equipment..............	28,000	11,000	11,000	20,000
Construction...................	54,000	78,000	78,000	103,000
Naval Reactors Development.......	$495,920	$526,910	$526,910	$613,000
Staffing FTP/Total FTE's	216/222	203/209	203/209	207/213

Authorization: Section 31, P.L. 83-703

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[1] Funding for Enriched Material was included in the Uranium Enrichment program in FY 1982 and prior years and the Materials Production program in FY 1983. It has been transferred to Naval Reactors Development for FY 1984. Actual total Naval Reactors Development funding levels were $359,120,000 in FY 1982 and $417,910,000 in FY 1983.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES

ATOMIC ENERGY DEFENSE ACTIVITIES
(In thousands of dollars)

FY 1983 Appropriation Enacted	$526,910
Built-in increases and decreases:	
None	0
FY 1984 Base	$526,910
Program increases and decreases:	
Plant Development	
Provides for continuation of ongoing work	+1,000
Subtotal	+1,000
Reactor Development	
Provides for continuation of ongoing work	+13,050
Continues construction of fuel factory	+30,000
Allows for continuation of Advanced Fleet Reactor Work, including procurement of materials	+22,600
Subtotal	+65,650
Reactor Operation and Evaluation	
Provides for continuation of ongoing work	+1,000
Allows increased reactor servicing work	+6,900
Subtotal	+7,900
Enriched Material	
Provides for operating fleet requirements	+11,000
Subtotal	+11,000
Program Direction	
Provides for continuation of approved personnel levels	+540
Subtotal	+540
FY 1984 Budget Request	$613,000

Total Estimated Cost (TEC) $20,900,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, objective, and justification (cont'd)

b. Management and contracting:

ID will be responsible for the design and construction of the PREPP with the support of appropriate subcontractors. ID approval will be required for the preliminary design, the final design, and initiation of procurement of long-lead items. It is anticipated that design will be performed through an Architect-Engineering subcontract and construction will be managed under the INEL site construction management contract. Operation of the facility will be the responsibility of the prime INEL operating contractor, EG&G Idaho, Inc.

c. Prior year achievements:

During FY 1982, the conceptual design and cost estimates will be completed.

d. Current year achievements:

During FY 1983, final design (Title I and II) will be completed and procurement of long-lead equipment will be initiated.

e. Reasons for increases and decreases:

Not applicable.

f. Cost estimate

The costs shown are based upon the completed conceptual design. The funding outlined in this schedule is limited to the actual design, construction, installation, and check-out periods for the PREPP. The Total Estimated Cost (TEC) for the PREPP is as follows:

	Item Cost	Total Cost
1. Engineering, Design, Inspection, and Project Management at 23% of Construction Cost, Item 2		$ 3,000

Processing Experiment Pilot Plant
Idaho Operations Office

Total Estimated Cost (TEC) $20,900,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, objective, and justification (cont'd)

	Item Cost	Total Cost
2. Construction and Installation Costs		$ 13,000
(1) Improvements to land	$ 100	
(2) Buildings and structures	3,600	
(3) Process equipment	8,800	
(4) Utilities	300	
(5) Demolition and removal	200	
Subtotal		$ 16,000
3. Contingency at approximately 30% of above costs		$ 4,900
Total Estimated Cost		$ 20,900

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW
Naval Reactors Development

The Naval Reactors Development program is carried out under the management of the Director, Naval Nuclear Propulsion Program, who is responsible for all matters pertaining to nuclear propulsion of naval ships.

The Naval Reactors Development program involves design, development, improvement, testing, and evaluation of nuclear propulsion plant components and reactor cores. The objective of this effort is to enhance the performance and reliability of naval reactors and to simplify operating and maintenance requirements. Naval nuclear propulsion plants come in a variety of configurations ranging from the very small plant used in the research submarine, NR-1, to the large reactors used in nuclear powered aircraft carriers.

Nuclear propulsion provides our warships with virtually unlimited high speed endurance and freedom from a logistics umbilical cord for propulsion fuel. This greatly reduces the vulnerability of Navy ships to enemy action and increases their capabilities for sustained combat operations.

To take full advantage of the substantial benefits of nuclear power, nuclear propulsion plants must perform reliably and be durable. This is necessary to ensure the maximum number of warships are available for front line duty at all times and are capable of carrying out their missions. The Naval Reactors Development program is aimed at improved performance.

Efforts are underway to provide more speed. This is an important military characteristic in getting to the combat area quickly, in out-maneuvering an opponent, in prosecuting attacks, and in leaving the area. Increasing the power of nuclear propulsion plants is also necessary to support new features, weapons systems, sonars, and other equipment in various submarine and surface ship configurations.

Efforts are also underway to improve the ability of our ships to recover from battle damage at the scene of action and to extend the life of reactor cores. Longer lived cores are important from a military standpoint because they increase the likelihood that, at the outbreak of hostilities, our warships will have enough fuel to last the duration. Longer lived cores also reduce the need for costly refuelings, minimize the production of radioactive waste, and reduce personnel exposure to radiation.

Major work to be performed under the Naval Reactors Development program includes an Advanced Fleet Reactor to obtain higher plant performance; the higher power and longer life D2W core for shipboard application; a Submarine Test Core to test advanced reactor fuels, poisons, and cladding materials which have the potential for improving core performance and increasing core lifetime; the OHIO Class TRIDENT ballistic missile submarine propulsion plant; development of new and improved fuels and materials for potential use in nuclear propulsion plants; operation of the prototype nuclear propulsion plants to test new reactors, components, concepts and materials; investigation of reactor concepts which offer the potential of increased power density and longer life; improvement, evaluation and technical support of existing nuclear propulsion plants, components, systems and cores; and development of replacement components and systems.

For Fiscal Year 1984, the Naval Reactors Development program budget request is $613 million. This provides for the continuation of work in the areas indicated above. The $86.1 million increase over the Fiscal Year 1983 budget is principally due to escalation, the ongoing naval nuclear fuel facility construction project, servicing of several prototype nuclear propulsion plants, advanced core development, and costs of enriched material.

I. PLANT DEVELOPMENT	FY 1983 Appropriation	FY 1984 Request
Operating Expenses	$58,000	$59,000

The Plant Development portion of the Naval Reactors Development program is aimed primarily at improving plant reliability and performance. This includes developing improved reactor and steam plant components and systems, and developing alternate plant materials, new heat treatment methods and new chemistry treatment and water purification methods.

Component and system development work starts with reactor plant arrangement studies based on operational requirements and continues through design, testing, and operational support of installed equipment. In addition to performance and reliability, noise reduction and shock resistance are particularly important. This work involves developing sophisticated mathematical models with which to predict performance in simulated plant operation and to evaluate actual component performance at a later date. Full scale mock-ups are used to verify installation suitability and maintenance capabilities of components and systems prior to manufacture and testing of components.

The interaction between various materials and water chemistries is important to the performance and reliability of nuclear propulsion plant systems. Alternate material and chemistry candidates are subjected to extensive testing and evaluation. The most promising are then pursued under prototypal conditions and environments to verify material performance characteristics prior to qualifying them for application in reactors. This program includes development of new techniques for testing and analyzing materials, water chemistry performance, heat treatment, corrosion, mechanical properties, and failures.

The Plant Development work encompasses two areas: (a) Materials, Chemistry and Supporting Development; and (b) Plant Technology.

a. Materials, Chemistry and Supporting Development

This portion of the Plant Development work encompasses the development and analysis of plant materials that are not part of the reactor itself. It includes research into water purification chemistry control, and into radiological and environmental monitoring and engineering.

Reactor plant structural materials development includes performance testing, generation of design data for various applications, failure analysis, and identification of material product and process requirements for manufacturing. This effort includes developing new techniques for material testing, new ways to study the mechanisms of stress corrosion and corrosion fatigue, as well as developing and carrying out programs to evaluate and resolve uncertainties in material performance for long lived components. After screening by accelerated testing, promising material candidates are subjected to long term qualification tests in prototype environments. By understanding basic failure mechanisms, specifications and operating procedures can often be developed and refined to preclude failures. This effort also includes extensive qualification programs in material heat treatment, fabrication, and surface preparation to enhance the in-service reliability of plant materials.

Welding is an important aspect of nuclear propulsion plant construction and reliability. Continuing development efforts are underway to develop and qualify improved procedures for initial welding and rewelding of equipment during refueling and other maintenance operations. Development of improved non-destructive inspection methods is another important part of the program to provide increased assurance of reactor plant integrity, both during construction and during inspection of operating components. This program also provides for quality assurance, review, and surveillance of laboratory testing and manufacturing activities. This is particularly important in ensuring valid test data.

For Fiscal Year 1984, efforts in this program will include: (1) investigation, development, and qualification of materials and material processes leading to reduced corrosion and improved component performance, reliability, and lifetimes; (2) testing of materials for longer life and higher performance, (e.g., mechanical property tests on various materials removed from prototype reactors to confirm design adequacy and freedom from stress corrosion cracking) (3) evaluation of the effects on materials of plant chemistry and operating conditions; (4) continued development of seal materials and welding procedures to improve performance and reduce costs.

Development and qualification of new steam plant chemistries and improvement of methods used in steam generator water chemistry control are further aspects of the Plant Development effort. Understanding equipment behavior using different water chemistry control methods is an important aspect of plant reliability and maintenance.

During Fiscal Year 1984, work in this area will include developing simpler and less costly methods for cleaning steam generators, improving the ability of reactor coolant purification media to remove dissolved and particulate radioactivity, and developing improved methods for reactor plant decontamination.

Ensuring that reactor operations and research and development activities for the Naval Nuclear Propulsion Program are conducted safely and in compliance with applicable Government regulations, an extensive program of radiological monitoring and engineering is in effect. This includes acquisition of equipment and facilities for maintaining radiological training. During Fiscal Year 1984 work will include: providing techncial input to operating activities in areas of radiological work procedures, personnel and area radiation monitoring, training, surveillance, containment designs, radiological facility upgrading, waste management activities, and environmental monitoring and evaluations to support conclusions of environmental impact statements regarding methods for disposal of reactor plant components.

b. Plant Technology

The Plant Technology portion of Plant Development work covers research and development associated with primary plant fluid, mechanical, and electrical systems instrumentation; reactor control systems and components; and prototype plant off-hull and steam plant systems and components. The work is aimed at developing new equipment and resolving problems of operating ships. It also includes arrangement studies to reduce space and weight, to simplify operation and maintenance, and to improve reliability.

Plant component and system work includes design and analysis of improved steam generators, pressurizers, pumps, valves and heat exchangers. This involves sizing the components to meet operational and space requirements and factoring in new materials as they are proven out in the materials development and testing program. Detailed analytic models are developed to show the interrelationship of components and systems and to simulate reactor operations in abnormal and casualty situations as well as during normal operations.

In Fiscal Year 1984, Naval Reactors will: (1) conduct plant evaluations including reactor protection, safety analyses, and environmental monitoring; (2) continue to upgrade engineered safety systems for the operating prototypes; (3) continue to qualify alternate materials and monitor performance of steam generators and other primary plant components to achieve improved performance and reliability; (4) conduct plant design analysis for continued plant operations and for the backfit of an advanced reactor in the CGN 36 and 38 cruiser classes; and (5) continue preparation of procedures for future refuelings of SSN 688 Class ships.

Electrical components and reactor instrumentation and control systems are of utmost importance to the safe and reliable operation of a naval nuclear propulsion plant. New design equipment involving the latest technology in the fields of electronics and electrical power distribution and control are tested extensively in the laboratories for reliability and for compatibility with other systems. Testing and operational data from experiments, prototypes, and operating ships are evaluated to ensure that the electrical components and instrumentation and control systems are operating in accordance with design specification.

During Fiscal Year 1984, work will continue on developing advanced design and a new generation of equipment for application to naval nuclear reactor plants. Efforts will continue to upgrade and improve the reliability of naval reactor prototype plant electrical systems. This will include installing improved design control and instrumentation equipment, and replacing obsolete engine room and off-hull electrical equipment such as circuit breakers, motors, and motor controllers. This program also includes providing plant analyses, engineering evaluations, and equipment and systems modifications. The plant analysis for the Submarine Test Core will be completed to ensure safe operation of the plant.

Other efforts conducted in this category include: (1) development of operating, maintenance, casualty, and test procedures; (2) assistance to shipyards during ship availabilities and acceptance testing; and (3) analysis of performance data from operating plants and resolution of problems arising during fleet operations. Reactor plant analyses for reactor protection, test safety, and plant startup and operation are provided for prototype and shipboard plants.

Throughout Fiscal Year 1984, the laboratories will continue to support new ship construction, refuelings, overhauls, and testing in eight shipyards, and will provide engineering liaison to the shipyards with respect to reactor plant development for all classes of nuclear ships.

II. REACTOR DEVELOPMENT

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses	$157,125	$188,800
Capital Equipment	11,000	20,000
Construction	78,000	103,000
TOTAL	$246,150	$311,800

The Reactor Development effort focuses on improving the power capabilities, endurance, and reliability of naval reactors ranging from relatively small submarine reactors to the large ones used in nuclear powered aircraft carriers. The objective is to design and develop improved reactors based on the latest reactor concepts, technology, and experience.

Reactor fuel and poison elements are very important in developing reactor cores of increased endurance and power. These must be able to accommodate the higher fuel and poison loadings, and sustain the irradiation damage that is inherent with higher power densities or longer operating lives of reactor cores. To ensure high integrity throughout operation over the long lifetimes of present cores requires care and attention in establishing the configuration of advanced fuel and poison elements. These highly loaded cores also require development of advanced control rod materials and control concepts. Optimizing the performance, life, and power of reactor cores in the hostile environment in which they operate demands sound and careful engineering and powerful analytic tools to predict what the long term reactivity behavior and material response in various core concepts will be.

The Reactor Development effort includes the fabrication of prototype cores and components for installation, operation, and testing in prototype reactor plants under operating conditions. This includes developing sophisticated processes and inspection techniques to ensure quality during manufacture of these advanced cores. Data from examination of expended cores constitute important feedback as to the long term behavior of these cores from the standpoint of nuclear characteristics, materials, and performance.

The Reactor Development portion of the Naval Reactors Development program is broken down into five major areas: (a) Core Examination, (b) Materials Development, (c) Nuclear Design and Analysis, (d) Reactor Process Development, and (e) Reactor Technology.

a. Core Examination

This includes examination of expended cores and test specimens irradiated in the Advanced Test Reactor as well as examination of plant materials and components from operating reactors and test facilities. Core examinations are conducted at the Expended Core Facility in Idaho; the laboratories also have the capability to examine limited amounts of irradiated materials in hot cells.

Expended core examinations provide important design confirmation and insight into the long term behavior of material and components in operating reactors. Using the latest design and analysis methods, it is possible to compare predicted and actual materials behavior in areas such as structural distortion from neutron flux or corrosion.

Dimensional stability, corrosion behavior, and irradiation-induced damage resulting from accelerated tests in a reactor environment can be determined through examination of test specimens. These test results are considered in establishing design limits for fuel and poison elements; in evaluating prescribed margins to failure; and in qualifying the analytic models used to predict fuel and non-fuel performance in advanced design reactor applications.

Destructive and non-destructive examinations of material that has been subjected to long term service reveal important information regarding plant materials corrosion and mechanical behavior under irradiation. Based on this information, materials or operational limits are modified as required.

During Fiscal Year 1984, the examination of expended cores and fuel element irradiation test samples will continue at the Expended Core Facility. This will include: (1) examining expended cores to evaluate actual performance and component condition against predictions; (2) conducting irradiation tests; and (3) examining test samples from fuel and cladding materials development programs.

b. Materials Development

The Materials Development portion of the Reactor Development work is aimed at developing improved materals and new manufacturing processes for longer life and higher power naval nuclear cores. This is instrumental in developing cores of enhanced endurance and power.

The Materials Development work includes developing high integrity nuclear fuels, poisons, and cladding that are both suitable for application in advanced naval cores and viable for manufacture. An important factor is to find fuel and poison materials which change dimensions as little as possible over their lifetimes. New fuel and poison materials developed through laboratory research are produced on a pilot-scale basis. Small scale test specimens are irradiated in a reactor environment and then examined for growth, structural integrity, and corrosion properties. Most irradiation testing of material specimens is carried out in the Advanced Test Reactor in Idaho. The irradiated specimens are examined at the laboratories in addition to the work previously noted at the Expended Core Facility. Upon completion of this work acceptable materials are qualified for production use. In addition, data derived from the irradiation tests are incorporated into design specifications and guidelines for future cores.

Another important effort is the development of improved corrosion-resistant materials needed for long life cores. New cladding materials and heat treating processes for existing materials are tested under prototypal conditions and the results compared with analytic predictions and with data gained from operating and test experience.

During Fiscal Year 1984, Naval Reactors will: (1) assess new concepts and technologies for advanced fuel and poison elements; (2) investigate and continue qualification testing of alternate materials for fuel and poison elements, cladding, and core structurals for possible use in advanced cores with longer life and higher performance including in-reactor testing of the most promising alternate alloys and autoclave and electrochemical tests; (3) continue to characterize bond quality; (4)

develop processing techniques and irradiation test qualifications for using Zircaloy-4 with naval fuels; and (5) develop models to predict material corrosion behavior.

c. Nuclear Design and Analysis

This work provides for research and development in the fields of reactor physics, nuclear design of improved reactor cores, and analysis and testing of operating reactors. Physics design and analysis of existing and new naval reactor cores is aimed at establishing and confirming the fuel and poison loading requirements, reactivity, power and flux distributions, and lifetime attributes. Shielding design and analysis work is directed toward ensuring that radiation levels experienced by operating and maintenance personnel remain at or below established limits. Safety analysis of reactor plants and fuel handling facilities assess the adequacy of operating and casualty procedures and the potential consequences of an accident.

Each of these areas of activity involves developing analytic models, preparing computer codes, and confirming these codes and models through test data and actual behavior. Data from nuclear analytic models are verified and updated with test data obtained from operating prototype cores. Detailed critical experiments are conducted to mock-up and test advanced core fuel and poison compositions and core geometries. This experimental data is used to help establish core fuel and poison loading, reactivity control rod worths and reactivity coefficients.

During Fiscal Year 1984 Naval Reactors will: (1) continue to perform physics and nuclear design calculations and studies for use in the design of the Advanced Fleet Reactor; (2) monitor core performance and evaluate data from periodic engineering and physics tests; (3) perform physics analysis of Submarine Test Core fuel modules; and (4) continue work on the Developmental Fuel Core.

Core geometries and fuel poison loadings are established based on given space envelopes and core characteristics to meet nuclear design requirements for safe operation. The objective is to develop core designs that will meet all operational requirements while optimizing core depletion, assuring efficient utilization of the fuel, and minimizing adverse material conditions in the reactor. The program includes establishing physics test procedures and programs for use in evaluating operating cores and then using operating data to confirm analytic models and performance of the core in accordance with design parameters.

During Fiscal Year 1984 Naval Reactors will continue to develop and document nuclear technology through data collection, testing programs, development of analytic models, and other experimental programs conducted at the laboratories. Work will also include disassembly of the Advanced Submarine and A1G mock-up cores.

The proper shielding of reactors is essential to protect operating and maintenance personnel from exposure to radiation in excess of established limits. Work in this area involves shield surveys of operating plants and new plant startups to assure the radiation levels are within the design specifications and guidelines. This work includes developing, testing, and certifying for use improved shielding design methods and materials. The objective is to develop new methods and materials that reduce radiation levels and weight requirements, and simplify installation. Work is also underway on shielding designs for refueling equipment, shipping casks and containers to ensure they meet radiation guidelines for refueling and shipping operations.

Throughout Fiscal Year 1984 efforts in this area will include providing radiation level and shield design calculations to support preparations for refuelings and reuse of irradiated components. New plant shield designs and modifications of existing plants will be analyzed for possible application in connection with advanced cores.

The safety analysis program entails developing calculative models and design procedures for use in evaluating postulated reactor plant accidents; designing and performing experiments to verify analytic models; and implementing controls for the safe storage, handling, processing, and safeguarding of fissile material. Work in Fiscal Year 1984 will involve preparing various safety analysis reports; continuing to develop and qualify improved safety analysis methods; and evaluating and updating various prototype reactor system protection analyses.

The laboratories maintain computer systems to assist in their design, development, and testing work. Efforts will continue to increase the capability and productivity of the advanced scientific computers to achieve maximum return on computer hardware and software investment.

d. Reactor Process Development

The Reactor Process Development portion of the Reactor Development work is aimed at developing manufacturing processes and quality improvements in the manufacture of prototype cores and associated components. To take full advantage of advanced core designs requires increasingly greater attention to the manufacturing process to develop and reduce to practice improved methods of manufacturing advanced fuel and poison elements on a large scale basis. Reactor Process Development includes work on improved heat treatment and welding techniques, improved materials, and improved inspection techniques.

As new materials and design features are qualified for use, considerable effort is required to ensure they can be manufactured in an industrial environment. New design cores typically contain advanced fuel and/or cladding systems which often require development and qualification of new manufacturing and quality control processes. This requires considerable time and effort as the various components are subjected to elaborate destructive and non-destructive inspection throughout the manufacturing process.

During Fiscal Year 1984, Naval Reactors will: (1) continue to develop the nuclear, thermal/hydraulic, and mechanical design of the Advanced Fleet Reactor; (2) continue Advanced Fleet Reactor fuel element and fuel assembly development, initiate element preproduction and proceed with fuel assembly preproduction; (3) conduct Advanced Fleet Reactor engineering tests; (4) complete fuel assembly development for the Submarine Test Core; and (5) qualify new fuel and poison technologies.

e. Reactor Technology

The Reactor Technology segment of the Reactor Development work is aimed at designing advanced reactors with improved fuel and poison systems, longer life, and enhanced operating characteristics. This consists of four principal activities: (1) design of reactor components to meet functional requirements; (2) analysis of the components to demonstrate acceptable performance over their design lifetime; (3) manufacture and testing of the components to assure they will function properly under operating conditions; and (4) advanced technology development aimed at solving complex problems.

The component design process focuses on balancing the often competing requirements of performance, ease of fabrication and servicing, and reliability. The objective is to exploit the advantages of new technology to reduce reactor noise and achieve longer life and/or higher performance cores. This requires detailed analyses of the thermal and structural characteristics for these components. In this regard, operational conditions are simulated through computer analysis and the analytic models then confirmed through testing and operation.

During Fiscal Year 1984, work will continue in the area of fabricating the Advanced Fleet Reactor equipment and instrumentation for prototype application and ordering component materials. Mechanical and core design work will continue to support installation of the Submarine Test Core in a prototype plant. In addition, experimental work will be done in core channel vapor fraction and hydraulic analysis qualification; review and analysis of equipment problems; and performance of fluid mechanics experiments.

These development efforts will include scale model hydraulic testing to evaluate reactor coolant flow distribution and pressure drops. Thermal, hydraulic, and mechanical test programs are designed to evaluate the performance in prototypal environments. Data from these test programs are used to confirm the suitability of reactor components prior to release for normal operation. This data is also incorporated in the design manuals for current and future use.

During Fiscal Year 1984, Naval Reactors will: (1) continue to perform Advanced Fleet Reactor thermal, hydraulic, and protection analyses; (2) perform thermal, hydraulic, and mechanical tests of core components; (3) continue to improve thermal and hydraulic design methods by conducting thermal and hydraulic tests to obtain data to qualify computer codes to predict two-phase, turbulent fluid flow under particular coolant channel conditions; and (4) continue development and analysis of design concepts for advanced core reactors with longer life and/or higher performance.

Advanced reactor core designs are developed and factors are optimized to obtain a new balance which will provide the desired characteristics. This involves preparation of test procedures and testing, even subsequent to reactor installation and criticality. In Fiscal Year 1984, Naval Reactors will: (1) continue to evaluate properties of advanced materials at high temperatures for use in design development; (2) examine more complex equipment configurations; and (3) continue to develop three-dimensional structural and thermal analysis programs.

Capital Equipment

Capital equipment requirements for Fiscal Year 1984 include computer-aided drafting equipment for the laboratories as well as other laboratory support equipment. The computer-aided drafting equipment has proven to be an important engineering aid for constructing analytic models of reactor components and for maintaining a computerized data base of drawings for major projects and designs.

To accomplish the objectives of the program, the following types of capital equipment are necessary: (1) quality assurance equipment, including upgrading and metrification of measuring equipment; (2) process development equipment, such as laser and metal-working equipment; (3) laboratory engineering and test equipment, including pumps, laboratory transducers, and autoclaves; (4) analytic, spectrochemical and corrosion laboratory equipment, such as test units, systems and analyzers; (5) fabrication and inspection equipment, including manipulators, oscillographs, and miscellaneous replacement equipment; and (6) radiation and safety equipment such as survey meters, assay gauges and a large spectra system, and improved decay heat removal equipment for prototypes including remote instrumentation and controls/readouts. Improved and replacement equipment components and systems, such as reactor plant control and instrument detectors and systems, are required for the prototype reactor plants to continue to provide improvements in reliability and increase plant efficiency. Additional capital equipment is also needed to provide for the analysis and examination of spent fuel assemblies and other components operated in nuclear propulsion plants. This includes: handling, processing, assembly and storage equipment, and various support equipment components.

Construction

Major construction funds are requested in Fiscal Year 1984 for the Modifications and Additions to Prototype Facilities (MAPF), project number 81-T-112, for the Materials Facility, project number 82-N-111, and the Addition to the Radioactive Materials Laboratory, project number 83-N-102.

The MAPF project provides for modifying and adding to the engineered safety features of several prototype plants. This project received full authorization in Fiscal Year 1981. The work primarily involves upgrading the emergency fluid and electrical systems, and includes construction of necessary equipment and support buildings. The prototype plants involved are the D1G and S3G plants at West Milton, New York, and the S1C plant located in Windsor, Connecticut.

Funds for the Materials Facility at Savannah River, South Carolina, are to continue construction of a second source for manufacture of naval nuclear fuel. Initial funds were provided in Fiscal Year 1982 and design work is presently underway. The

Department of Energy is currently dependent on only one supplier for the naval nuclear fuel upon which over 40 percent of the Navy's combatant ships depend. This leaves the Naval Nuclear Propulsion Program vulnerable to the risk of prolonged disruption in fuel supplies because of strikes, operational shutdowns, natural catastrophes, or other unanticipated problems. The added capacity provided by this project will also allow flexibility to accomodate an expanded shipbuilding program.

In addition, funds are requested to complete the design and construction of a shielded facility to be located in an extension of the Radioactive Materials Laboratory at the Knolls Atomic Power Laboratory. The new shielded facility will provide needed additional testing and examination capacity for Naval Reactors' efforts in analyzing advanced fuel systems currently under development as well as continued evaluation of existing fuel systems.

General Plant Project funds provide for minor plant improvements, alterations, additions, and minor new construction at Naval Reactors' laboratories. In general, these projects consist of land improvements, building alterations, utility improvements, and additions to or upgrading of existing facilities. The work contemplated under these projects will provide continuity of present and planned operations, contribute to operating efficiencies, eliminate potential health, fire, and operating costs, and provide facilities to take full advantage of technological advances. The estimate for Fiscal Year 1984 General Plant Projects is based on experience in prior years and takes into account new facilities which are coming into operation and certain special non-recurring projects, which, because of their nature, fall within the criteria for General Plant Projects.

III. REACTOR OPERATION AND EVALUATION

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses	$104,100	$112,000

The Reactor Operation and Evaluation segment of the Naval Reactors Development program involves the operation of land based prototype nuclear propulsion plants and their related servicing and evaluation. These prototypes are operated to test developmental nuclear propulsion plants, cores, and components. While accelerated testing and special test facilities are a valuable aid in simulated behavior of various components and materials, there is no substitute for the actual in-service experience obtained from the operation of the prototype plants. Only through actual operation is it possible to determine performance and confirm designs under operational conditions and without interfering with fleet operations. The prototype reactors and components are fully instrumented to provide test data needed in support of the laboratories' developmental programs. The prototype plants provide an ideal test bed for new concepts, materials, and designs while gaining operational experience in advance of reactors in the fleet.

Work in this area also includes developing reactor servicing procedures and equipment as well as actual reactor servicing. Servicing work includes: maintenance, refuelings, disassembly, fuel exchange and reassembly operations on reactors, examination of installed reactor components, and removal of reactor components for examination. Equipment and procedures developed for prototype operations are used to the maximum extent possible in preparing for the servicing and refueling of shipboard reactors. The Reactor Operation and Evaluation work can be broken into three ongoing efforts: (a) Reactor Engineering and Analysis, (b) Reactor Operation and Testing, and (c) Reactor Servicing and Refueling

a. Reactor Engineering and Analysis

This work includes evaluating reactor performance and mechanical condition to assure continued ability to operate within design specifications. This entails plant examination, analysis of operating data, nuclear and thermal performance testing and analysis, and brittle fracture analysis of reactor equipment.

Thermal and hydraulic analyses establish the performance capability of a reactor in relation to power distributions. Based on this information acceptable core power limits and operating procedures are defined which will ensure safe reactor operation. Periodic tests of flow rates and temperature distributions provide a basis for comparing actual performance with predictions. These operating prototype reactors represent the only practical source of data to confirm nuclear analysis methods and predict long life core behavior. As core life is extended, nuclear analysis of operating reactors has become increasingly important.

In Fiscal Year 1984, Naval Reactors will continue to perform: (1) thermal/hydraulic analyses for operation of the prototype reactor plants; (2) S8G core thermal/hydraulic design calculations for reactor protection analyses; and (3) nuclear, thermal/hydraulic, corrosion and structural evaluations for operating reactors.

The design of advanced cores takes into account operational data from the prototypes. At the prototypes, abnormal reactor operating modes can be analyzed to assure adequate design criteria. Reactor test programs provide data on thermal, hydraulic, mechanical, and acoustic performance at maximum power.

During Fiscal Year 1984, work will include: (1) conducting test programs for core components; (2) continuing design analytic efforts for installation and operation of upgraded prototype systems; and (3) performing periodic testing of prototype reactors and evaluating resulting data with respect to mechanical, thermal, and hydraulic attributes of the cores.

Reactor tests and examination of special prototype test assemblies which can be removed from the reactor provide vital information with which to qualify structural models and component designs. Information from these evaluations provides invaluable data with which to assess the adequacy of core structural components in naval ships.

In Fiscal Year 1984, reactor component design analysis work will continue in such areas as: (1) conducting brittle fracture assessments to confirm the capabilities of existing reactor vessels for continued use; (2) preparing for and following performance of plant refuelings; (3) providing technical assessments for plant operating conditions; and (4) evaluating hardware performance based on periodic and special testing.

b. Reactor Operation and Testing

This work covers actual operation and testing at the prototypes. These plants are operated in a manner that closely approximates shipboard nuclear propulsion plant operation. This requires prompt resolution of operational and equipment problems; continuous maintenance of the reactor plant, steam plant, and support systems; and review of plant conditions with operating personnel to assure safe operation of the plant.

Prototype reactor test programs consist of periodic physics, thermal, hydraulic, instrumentation and mechanical tests to ensure the plants are operating within design limits and to provide test data in support of developmental efforts throughout the laboratories. With increasing use of long life cores and with a fleet having a number of ships over twenty years old, this prototype testing has become increasingly important.

The prototype plants are operated by DOE prime contractor and Navy personnel. The prototypes, in addition to providing a test bed for proving out reactor plant systems and components, also provide a means to train nuclear propulsion plant operators for the fleet.

During Fiscal Year 1984 the prototype plants not shut down for servicing will continue operation for testing developmental components, cores, and systems, and for the training of personnel. Specific work items will include: (1) performance of reactor plant nuclear, thermal, hydraulic, and mechanical tests, plant modifications, maintenance and training, and operation of plant support systems for the prototypes;

(2) installation of instrumentation and control modifications; (3) facilities modifications; and (4) performance of overhaul and maintenance items.

c. Reactor Servicing and Refueling

This work covers servicing and refueling of prototype reactor plants and the preparations therefore. It includes design of refueling systems; design, development, and fabrication of reactor servicing equipment such as fuel cell transfer containers, fuel cell discharge stands, welding and cutting equipment, fuel cell disassembly, inspection and reassembly equipment, and the development of servicing techniques and procedures for performance of servicing operations. To ensure these operations are accomplished safely, procedures and equipment are subjected to extensive checkout programs. Problems encountered during checkout or during actual servicing operations are analyzed from an engineering standpoint and appropriate revisions made to preclude recurrence of these problems.

This work also includes developing and maintaining the capability to perform unplanned or contingency reactor servicing operations; the actual prototype reactor servicing and refueling work; the selection and training of servicing personnel; disposal of removed components; design and development of radioactive material shipping containers for new and spent fuel and for irradiated structural components; and testing and analyzing shipping containers as required for Nuclear Regulatory Commission certification.

During Fiscal Year 1984, Naval Reactors will: (1) continue design, development, and checkout of refueling equipment and systems; (2) conduct operations to support prototype plant refuelings, including S5G prototype refueling equipment checkout and qualification of equipment and personnel, preparations for the S1W prototype refueling, design of refueling equipment and preparation of procedures for refueling of the S3G, MARF, and S8G prototype plants; (3) conduct the D1G prototype interim inspection; (4) maintain the capability to perform unplanned or contingency servicing work; and (5) continue to prepare and issue new and revised component technical manuals and reactor plant servicing manuals.

IV. ENRICHED MATERIAL

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses	$109,000	$120,000

The Enriched Material portion of the Naval Reactors Develoment budget provides for enriching the uranium used in manufacturing reactor cores required for the nuclear powered ships of the U.S. Navy. The enrichment work is carried out by the DOE Office of Uranium Enrichment. This work is essential to the national defense.

The amount of enriched uranium purchased each year is determined by the needs of the Navy. The planned number of ship refuelings, tempo of fleet operations, number of ships under construction, and other schedular requirements dictate the number of cores to be fabricated for the Navy in a given year. This figure in turn determines the amount of enriched uranium needed by the core manufacturers in that year. The required enrichment services are then obtained from the Office of Uranium Enrichment.

Funding for Enriched Material was included in the Uranium Enrichment program for FY 1982 and prior years, and in the Materials Production program in FY 1983.

V. PROGRAM DIRECTION

	FY 1983 Appropriation	FY 1984 Request
Operating Expenses	$9,660	$10,200

The program direction funds provide for salaries, benefits, travel, and other expenses for 207 full time Federal employees at the Naval Reactors, Pittsburgh Naval Reactors, and Schenectady Naval Reactors Offices in support of the Naval Reactors Development and Water Cooled Breeder programs.

The Naval Reactors Development program provides support for nuclear powered warships which comprise over 40 percent of the Navy's combatant fleet, including a vital part of this Nation's strategic deterrence force. The Water Cooled Breeder program provides support for the development of the Light Water Breeder Reactor, the only breeding power reactor in operation in the United States.

Naval Reactors' personnel maintain close program management and technical direction of the Bettis and Knolls Atomic Power Laboratories and associated facilities, with a combined employment of about 6,500. These laboratories are Government-owned, contractor-operated facilities solely devoted to the Naval Reactors program. This effort includes: operation of eight land prototype reactor plants; coordination, oversight, and technical control of over more than 800 program subcontractors; design and procurement of developmental prototype reactor cores; and technical support for the reactor plants in 136 operating nuclear powered ships as well as 35 nuclear powered ships authorized or under construction. As part of this effort, close coordination and interface with Naval Reactors' Navy personnel is maintained to ensure an informed and orderly joint program.

Naval Reactors operates with austere staffing. Existing personnel are used to the greatest extent practicable in staffing new efforts and expansions of existing programs. Improvements in work force productivity have been achieved over the years, despite increasing workloads, by effective use of available staff.

The positions requested in FY 1984 are needed to support ongoing programs. These efforts will include: advanced material and component testing for corrosion and materials evaluation; prototype refueling efforts; prototype modification and upgrading efforts; increasing plant support work reflecting the growing age, number and diversity of operating ship and prototype reactor plants, sophisticated core development work aimed at developing high performance cores; and light water breeder reactor development.

FY 1984 CONGRESSIONAL BUDGET REQUEST
Atomic Energy Defense Activities
Naval Reactors Development

CONSTRUCTION PROJECT OVERVIEW
(in thousands of dollars)

Project Number	Project Title	TEC	FY 1983 Appropriation	FY 1984 Request
84-N-101	General Plant Projects	$ 2,500	$ 0	$ 2,500
83-N-101	General Plant Projects	1,500	1,500	0
83-N-102	Addition to the Radioactive Materials Laboratory	8,000	1,500	6,500
82-N-111	Materials Facility	176,000	40,000	70,000
81-T-112	Modifications and Additions to Prototype Facilities	110,000	35,000	24,000
	Total		$ 78,000	$103,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General Plant Projects

2. Project No. 84-N-101

3. Date A-E work initiated: 1st Qtr. - FY 1984

3a. Date physical construction starts: 1st Qtr. - FY 1984

4. Date construction ends: 3rd Qtr. - FY 1985

5. Previous Cost Estimate: None
Date: N/A

6. Current Cost Estimate: $2,500
Date: June 1982

7. Financial schedule

		COSTS			
Fiscal Years	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior Years	$ 000	$1,773	$1,300	$ 100	$ 000
1982	4,000	500	600	600	2,300
1983	1,500	000	1,000	400	100
1984	2,500	000	000	900	1,600
		$2,273	$2,900	$2,000	$ 4,000

8. Brief physical description of project

This project provides for minor plant improvements, alterations, additions, and minor new construction at Naval Reactors' laboratories. In general, this project consists of performing land improvements, building alterations, utility improvements, additions to existing facilities, and upgrading present facilities. The work contemplated under this project will provide continuity of present and planned operations, contribute to operating efficiencies, eliminate potential health, fire, and safety hazards, reduce maintenance and operating costs, and provide facilities to take full advantage of technological advances.

1. Title and location of project: General Plant Projects

2. Project No. 84-N-101

8. Brief physical description of project (continued)

The estimate is based on the past experience of the operations offices, with individual requirements as follows:

Pittsburgh Naval Reactors Office	$1,500,000
Schenectady Naval Reactors Office	$1,000,000

9. Purpose, justification of need for, and scope of project

The estimate for FY 1984 general plant projects is based on experience in prior years, and takes into account new plant and other facilities which are coming into operation, and certain special non-recurring projects, which, because of their nature, fall within the criteria for general plant projects.

In the past, work under general plant projects has included modifications or betterments to existing buildings and other facilities; additions to buildings to house new equipment or personnel; construction of new, small buildings; replacement or additions to roads and utility lines; and general area improvements and development programs to provide for safe and economic operation.

Although it is difficult to detail this type of project in advance, listed below are examples of subprojects under consideration. In general, the estimated costs given for each of the listed subprojects are preliminary in nature and primarily indicative of the size of the project. It should be noted that the continuing study of requirements will result in some of the projects being changed in scope, other projects being added, or necessary postponement of some now listed, all depending on conditions or situations not apparent at this time.

a. Energy Upgrade $300,000

This project covers modifications to existing facilities to reduce energy consumption. Modifications include installation of double pane windows, insulation on the exterior walls and ceiling, changes to heating, ventilation, and air conditioning equipment and ducts, installing high efficiency lighting and individual night setback thermostats. This project will help achieve the DOE goal of 20% reduction in energy consumption in existing buildings.

1. Title and location of project: General Plant Projects 2. Project No. 84-N-101

9. Purpose, justification of need for, and scope of project (continued)

b. Materials Building $500,000

This project provides for a building constructed of reinforced concrete with high density concrete partitions to house radioactive materials, a radiography facility, the radiac calibration laboratory, a radioactive material workshop, and associated administrative spaces. This building will reduce the potential of unrecorded radiation exposure to personnel by locating radioactive materials in a building specifically designed for the operation and storage of such materials.

c. Upgrade of Sewage Plant $300,000

To comply with expected effluent discharge requirements, upgrading of sewage plant treatment systems will be necessary. This upgrade can be accomplished by the addition of tertiary treatment facilities. This project will develop ground level settling beds as a means of tertiary treatment to ensure sewage effluent will meet anticipated discharge requirements.

10. Details of cost estimate

Details of cost estimates for this project are not available at this time. Detailed cost estimates for general plant projects are normally made in connection with the request for directive after the need for the work has been established, the job has been scoped, and preliminary engineering completed. The escalation rate used in these projections is 10%.

11. Method of performance

Design will be by the operating contractor and through negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be through fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

Not required.

13. Narrative explanation of total project funding and other related funding requirements

No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Addition to the Radioactive Materials Laboratory, Knolls Atomic Power Laboratory Schenectady, NY

2. Project No. 83-N-102

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3. Date A-E work initiated: 2nd Qtr. - FY 1983

3a. Date Physical Construction Starts: 2nd Qtr. - FY 1984

4. Date Construction ends: 3rd Qtr. - FY 1985

5. Previous Cost Estimate: N/A
Date:

6. Current Cost Estimate: $8,000
Date: December 1981

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$1,500 a/	$1,500	$1,500	$ 800
1984	6,500	6,500	6,500	3,700
1985	0	0	0	3,500

8. Brief physical description of project:

This project provides for the construction of a shielded hot cell to be within an approximately 70 x 80 foot extension to the Radioactive Materials Laboratory (RML) at the Knolls Atomic Power Laboratory. Construction of the approximately 36 x 24 x 16 foot cell within the RML extension will involve erection of high density concrete shielding walls, lead glass shielding windows, and installation of remote manipulators, work tables, interior lighting, in-cell fire protection and radiation monitors. Basic utility systems including compressed air, water and a radioactive exhaust ventilation and drain system will also be installed.

a/ Based on P.L. 97-377, Title I, Further Continuing Appropriations Act, 1983.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Addition to the Radioactive
Materials Laboratory, Knolls
Atomic Power Laboratory
Schenectady, NY

2. Project No. 83-N-102

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9. Purpose, justification of need for, and scope of project

The new hot cell will provide additional testing and examination capacity necessary to support Naval Reactor's efforts in analyzing advanced fuel systems currently under development as well as continued evaluation of existing fuel systems. Present hot cell capacity is not sufficient to handle the testing and examinations required as a result of the increased number of fuel types and systems being used, or being developed for use in naval nuclear ships. In addition, none of the existing hot cells are large enough to carry on all required operations. This results in time-consuming transfers of highly radioactive materials between cells increasing the potential for personnel exposure to radiation and contamination of areas external to the test cells.

A productivity gain of approximately 10% is anticipated due to construction of the new hot cell. These gains will result from elimination of intercell transfers of radioactive materials and the elimination of equipment removals and setups necessitated when operations are moved from one cell to another.

The FY 1984 appropriation request will provide for completion of the design, procurement of equipment for the cell, placement of contracts for the construction work, and construction of the shielded hot cell. The construction work is expected to take about two years.

10. Details of cost estimate

		TOTAL COST
a. Engineering, design, and inspection at 15% of construction costs, item b		$ 825
b. Construction costs		5,575
Buildings	$2,965	
Major Equipment	2,610	
c. Contingency at 25% of above costs		1,600
Total Project Cost		$ 8,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Addition to the Radioactive
Materials Laboratory, Knolls
Atomic Power Laboratory
Schenectady, NY

2. Project No. 83-N-102

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11. **Method of Performance**

Design of the building extension and associated support systems as well as the shielded hot cell will be performed by an architect engineer under a cost-plus-fixed fee contract. The construction and equipment procurement will be accomplished under fixed price contracts awarded on the basis of competitive bids.

12. **Funding schedule of project funding and other related funding requirements**

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding					
1. Total facility costs					
(a) Construction line item	0	$ 800	$3,700	$ 3,500	$8,000
(b) CP&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs	0	$ 800	$3,700	$ 3,500	$8,000

2. No other project funding will be required.

b. Total related funding requirement (estimated life of project: 20 years)

1. Facility operating costs	$ 20
2. Programmatic operating expenses directly related to the facility	$200
3. Capital equipment not related to construction but related to the programmatic effort in the facility	$ 0
4. GPP or other construction related to programmatic effort in the facility	$ 0
5. Other costs	$ 0
Total other related annual funding requirements	$220

1. Title and location of project:	Addition to the Radioactive Materials Laboratory, Knolls Atomic Power Laboratory Schenectady, NY	2. Project No. 83-N-102

13. Narrative explanation of total project funding and other related funding requirements

   a. Total project funding includes Construction line item only, for which no narrative is required. No other project funding is required.

   b. Total related funding requirements

      1. Facility operating costs include costs for heating, electricity, and normal maintenance costs for a facility.

      2. Programmatic operating costs include costs for operating technicians, radiation control technicians as well as material costs to operate the cell inclusive of costs for waste disposal.

      3. No other related funding is anticipated to be required for operation of this facility.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars)

1. Title and location of project: Materials Facility,
Savannah River, South Carolina

2. Project No. 82-N-111

3. Date A-E work initiated: 1st Qtr. - FY 1982

5. Previous cost estimate: $176,000
Date: June 1981

3a. Date physical construction starts: 2nd Qtr. - FY 1983

6. Current cost estimate: $176,000
Date: August 1982

4. Date construction ends: 3rd Qtr. - FY 1986

7. Financial schedule of construction project funding:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1982	$15,000	$15,000	$15,000	$ 9,170
1983	$40,000[1]	$40,000	$40,000	$32,000
1984	$70,000	$70,000	$70,000	$58,400
1985	$40,000	$40,000	$40,000	$56,430
1986	$11,000	$11,000	$11,000	$20,000

8. Brief physical description of project funding:

This project provides a materials facility at Savannah River, South Carolina as a second source to manufacture fuel from highly enriched uranium for further fabrication into cores for naval nuclear propulsion systems.

The process equipment will be enclosed in a new building located in the F Chemical Separations Area. The Main building is designed to contain 80,000 ft^2 on the first floor and 20,000 ft^2 on the second floor. The process area within the main building contains 27,300 ft^2 on the first floor and 13,700 ft^2 on the second floor. Interior surfaces will be finished in a manner to ensure cleanliness. The building will be partitioned so as to subdivide the interior of the facility into

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[1] Based on P.L. 97-377, Title I, Further Continuing Appropriations Act, 1983

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Materials Facility
Savannah River, South Carolina
2. Project No. 82-N-111

8. Brief physical description of project funding: (continued)

zones to facilitate material control. Office and personnel facilities including change rooms will be provided in the main building (about 11,000 square feet). The main building also includes a warehouse of approximately 6,000 square feet and a waste water treatment facility having a capacity of about 3,000 gallons per day (gpd).

Enclosures will be provided for major equipment pieces containing enriched uranium. Ventilation will be supplied to the building and the enclosures in such a manner as to control possible releases of uranium compounds. All ventilation air will be exhausted through high efficiency particulate air filters. The process steps to be employed will be patterned after the process used at the other naval fuel manufacturer. The process involves the conversion of highly enriched uranium into fuel materials suitable for use in fabricating naval reactor cores. The fuel manufacturing process is complex, involving highly sophisticated chemical and metallurgical technology involving at least ten changes of state of material handled, i.e., gaseous, liquid and solid, and over 60 separate processing steps are involved.

Manufacturing must be closely controlled, and the total system must be designed to preclude nuclear criticality accidents. Provisions are included for scrap recovery and recycle, waste treatment and recovery, and recycle of analytical and process control samples.

Special provisions will be included to ensure material control and accountability, physical safeguards and protection against fire. The process area of the building will be a high resistance structure and an interior fuel vault will be a maximum resistance structure.

9. Purpose, justification of need for, and scope of project:

The purpose of this project is to construct a Materials Facility to provide a second source of supply for naval nuclear fuel. The Department of Energy is presently dependent on only one supplier for the nuclear fuel used in the production of cores for the Navy's nuclear powered ships. Such dependence subjects the DOE to the risk of prolonged disruption in fuel supplies because of strikes, operational shutdowns, natural catastrophes, or other unanticipated problems. The added capacity provided by this project will also allow flexibility to accommodate an expanded shipbuilding program.

An assured supply of naval nuclear fuel is vital. Nuclear powered warships constitute over 40 percent of the Navy's combatant fleet. The vulnerability arising from sole source dependence for naval nuclear fuel is real and immediate, imposing an unacceptable risk on the ability to meet National security requirements. Accordingly, development of a second source for naval nuclear fuel is a matter of high priority.

1. Title and location of project: Materials Facility
Savannah River, South Carolina

2. Project No. 82-N-111

Efforts to get sources familiar with manufacturing highly enriched naval fuel in the private sector to invest in a fuel plant have been unsuccessful. The high cost of facilities required in relation to the potential volume of business, coupled with the needs for extensive safety, security and safeguards requirements and risk and uncertainty involved in production activities associated with highly enriched uranium, precludes this from being a commercially viable venture.

The design basis for the facility will be round-the-clock (24 hr./day, 7 days per week) with an overall attainment of 75%. Provisions will be included to meet all applicable environmental requirements, occupational and health standards and regulations pertinent to energy conservation.

The FY 1984 appropriation request of $70 million for Construction funds is to provide for:

a. Completing the design of the fuel material facility systems, equipment and buildings.

b. Completing the erection of the main manufacturing building and outside support facilities, including cooling towers, electrical substations, outside electrical distribution system, and the sanitary treatment plant.

c. Outfitting the laboratory, vault, and administrative areas within the main manufacturing building.

d. Installing equipment and piping in some process cabinets at the Savannah River central shops and installation of some cabinets in the manufacturing building.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Materials Facility
Savannah River, South Carolina

2. Project No. 82-N-111

10. Details of cost estimate:

(Dollars in Thousands)

Item			Item Cost	Total Cost
A. Engineering Design and Inspection at 22% of Total Estimated Cost				$ 39,000
B. Construction Costs				$121,640
1. Improvement to Land			$ 900	
(a) Roads, Walks & parking (contract)		335		
99 SY Road & Parking Area				
Concrete Curbs, Gutter & Walk				
(b) Fences & Gates (contract)		85		
3600 LF Chain Link Fence				
(c) Excavation & GrAding (contract)		185		
6 acres, 53K cubic yd. fill				
(d) Landscaping (Contract)		230		
8 acres				
(e) Miscellaneous		65		
2. Buildings			$ 15,740	
(a) FMF Building	4,080			
Frame (Contract)	10,830			
97,325 Sq. Ft. irregular shapped				
2-story metal siding Bldg.				
approx. size 283' x 363'				
(b) Bottled Gas Storage Bldg (Contract)		20		
168 Sq. Ft. 1-story Masonary Bldg.				
(c) Gate House		295		
725 Sq. Ft. 1-story Masonary Siding				
Concrete Bldg.				

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Materials Facility
Savannah River, South Carolina

2. Project No. 82-N-111

10. Details of cost estimate: (Continued)				
(d) Sanitary Treatment Storage Bldg. (Contract)	25			
(e) Stack (Contract) 9' diameter x 130' high	490			
3. Special Facilities		$88,700		
(a) Conversion/Finishing	33,250			
(b) Scrap Recovery	22,950			
(c) Assay Facilities	2,800			
(d) Storage, Aux. Suppt. Facs.	20,350			
(e) Shops	370			
(f) Electrical	3,3950			
(g) Health Protection	3,960			
(h) Security	1,670			
4. Utilities		$ 8,300		
(a) Services Piping -Overhead	1,480			
-UG Contract	1,580			
(b) Refrigeration	1,150			
Cooling Tower Contract	660			
(c) Sanitary Waste Treatment-Contract	410			
(d) Electric Service	1,900			
(e) Safety & Fire Alarm	820			
(f) Communications	300			
5. Miscellaneous		$ 8,000		
C. Removal Costs				$ 60
1. Electrical Distrib. & Fence	40			
2. Sewers & Fire Line (Const.)	20			
Subtotal (Items A,B, and C)			$160,700	

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Materials Facility
Savannah River, South Carolina

2. Project No. 82-N-111

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10. Details of cost estimate: (Continued)

D. Contingencies at approximately 9% of above costs	$ 15,300
Total Project Cost	$176,000[a]

11. Method of Performance:

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Schedule of project funding and other related funding requirements:

A. Total Project Funding	FY 82	FY 83	FY 84	FY 85	FY 86	Total
1. Total Facility Costs						
a. Construction Line Item	9,170	32,000	58,400	56,430	20,000	176,000
b. PE&D	0	0	0	0	0	0
c. Expense Funded Equpment	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0
Total Facilities Costs	9,170	32,000	58,400	56,430	20,000	176,000
	FY 82[b]	FY 83[c]	FY 84[c]	FY 85[c]	FY 86[c]	Total
2. Other Project Funding						
a. R&D (Engineering Studies)	1,600	100	200	300	-	2,200
(R&D)	3,850	2,750	2,350	2,350	500	11,800
b. Other Project Related Costs	5,050	4,200	5,900	10,400	11,900	37,450
Total Other Project Funding	10,500	7,050	8,450	13,050	12,400	51,450
Total Project Funding	19,670	39,050	66,850	69,480	32,400	227,450

[a] This estimate based upon firm design at 12% complete. (Conceptual Design was 100% complete in FY 1981.)
[b] Includes FY 82 and earlier funding.
[c] FY 1983 dollars.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Materials Facility
Savannah River, South Carolina

2. Project No. 82-N-111

12. Schedule of project funding and other related funding requirements: (Continued)

B. Total related annual costs (estimated life of project: 20 years) c/

1. Facility Operating Costs	$32,000
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	1,000
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Costs	$33,000

13. Narrative explanation of total project funding and other related funding requirements:

A. Total Project Funding

1. Total Facility Cost
   - a) Construction Line Item
   - b) PE&D
     None
   - c) Expense Funded Equipment
     None
   - d) Inventories
     None

2. Other Project Funding
   - a) R&D (Engineering Studies and R&D)
     These funds are for optimization studies and completion of develoment and demonstration studies.

c/ FY 1983 dollars.

1. Title and location of project: Materials Facility
Savannah River, South Carolina

2. Project No. 82-N-111

13. Narrative explanation of total project funding and other related funding requirements: (Continued)

B. Total Related Funding Requirements

1. Facility Operating Costs
Includes a full staff of operating and support personnel to operate on a 7 day, 4 shift schedule and operating suppliers.
2. Programmatic Operating Expenses Directly Related to the Facility
None
3. Capital Equipment Not Related to construction but related to the Programmatic Effort in the Facility
Includes equipment replacement on a normally expected frequency to continue viable facility operation.
4. GPP or Other Construction Related to Programmatic Effort in the Facility Forecast
None
5. Other Costs
None

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Modifications and Additions to Prototype Facilities

Various Locations

2. Project No. 81-T-112

3. Date A-E work initiated: 2nd Qtr. - FY 1981

3a. Date physical construction starts: 3rd Qtr. - FY 1982

4. Date construction ends: 4th Qtr. - FY 1986

5. Previous cost estimate: $110,000
Date: August 1982

6. Current cost estimate: $110,000
Date: December 1982

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$103,000	$10,000	$10,000	$ 1,370
1982	0	35,000	35,000	7,763
1983	0	35,000	35,000	25,000
1984	1,000	24,000	24,000	28,000
1985	6,000	6,000	6,000	45,237
1986	0	0	0	3,630

8. Brief physical description of project

This project provides for modifying the engineered safety features of several naval prototype nuclear propulsion plants, principally the S3G, S1C, and D1G land-based prototypes at West Milton, NY (S1C at Windsor, CT). These prototypes are currently used in the research and development of naval nuclear reactor designs and as training facilities for operation of naval nuclear plants. The work primarily involves upgrading the emergency fluid and electrical supply system capabilities and includes construction of necessary support buildings. This will provide system capabilities similar to

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Modifications and Additions to Prototype Facilities

Various locations

2. Project No. 81-T-112

---

8. Brief physical description of project (continued)

those installed in the newest prototypes. The upgrading as identified as part of an ongoing review and will be carried out in conjunction with the planned refuelings of these plants.

9. Purpose, justification of need for, and scope of project

The purpose of the project is to modify and make additions as necessary to the land-based prototype nuclear propulsion plants in light of upgraded requirements for engineered safety features such as those defined by the Code of Federal Regulations.

Subsequent to the construction and initial operation of these prototypes, the Code of Federal Regulations requirements for engineered safety features has undergone extensive revisions. Although all the prototypes have had an outstanding safety and performance record since their initial operation, this project will enhance the continued safe operation of these prototype plants. Upgrading of the prototypes in light of the latest Code of Federal Regulations and to take advantage of continuing advances in the state of the art in reactor safety is desirable at this time because of the fact that the needed changes can be most efficiently implemented in conjunction with planned refuelings.

The prototypes are used for research and development of NR designs and to train crews for the Navy. Therefore, it is important that the upgrading be coordinated with prototype operations in order to minimize the impact on scheduled test programs and crew training. To accomplish this, the proposed construction program for the prototype facilities and equipment principally involved is compatible with scheduled prototype shutdowns for refueling and maintenance.

The project will include the design, procurement, and installation of improved engineered safety system capability for these naval prototype nuclear propulsion plants. This work will include installing: dual emergency diesel power supplies, pumps for an auxiliary charging system, tanks to hold the backup charging water supply, and associated piping. The work will also include the addition of state of the art systems in areas such as electrical control and instrumentation equipment, heat removal, and ventilation where required. These new features will be designed for redundancy. Upgrading of other reactor plant controls and systems, and construction of plant support buildings to house the equipment is also included. In addition, auxiliary control rooms will be designed and installed to provide for the backup remote control of engineered safety systems and monitoring of these prototypes should emergencies occur. The necessary engineering and design effort is also incorporated to ensure the new equipment will be compatible with the existing prototype systems.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Modifications and Additions to Prototype Facilities

Various locations

2. Project No. 81-T-112

9. Purpose, justification of need for, and scope of project (continued)

The FY 1984 Appropriation Request of $24 million for Construction Funds is to provide for:

a. Continuing construction of the plant support buildings and installation of the engineered safety systems, including placement of all contracts.

b. Continuing procurement and delivery of equipment.

c. Continuing engineering and construction management of the construction and installation work.

10. Details of cost estimate	Item Cost	Total Cost
a. Engineering Design and Inspection		$ 18,600
1. Architect Engineer Service	$15,600	
2. KAPL Design and Inspection	3,000	
b. Construction		64,800
1. Improvements to Land	700	
2. New Building Construction or Remodeling	20,100	
3. Other Structures	4,700	
4. Special Facilities		
a. Engineering Equipment	11,300	
b. System Installation	26,800	
5. Utility Work	1,200	
c. Standard Equipment		21,600
Subtotal.		105,000
d. Contingencies at 4.5% of above costs		5,000
Total Estimated Project Cost		$110,000[1]

---

[1] This estimate is based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Modifications and Additions to Prototype Facilities

Various locations

2. Project No. 81-T-112

---

11. Method of Performance

Design and inspection will be performed in part under a negotiated architect-engineer contract and in part by the operating contractors. Construction, procurement, and installation of test equipment will be accomplished by contracts awarded on the basis of competitive bidding to the maximum extent possible.

12. Schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$1,370	$ 7,763	$25,000	$28,000	$45,237	$3,630	$110,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	$1,370	$ 7,763	$25,000	$28,000	$45,237	$3,630	$110,000
2. Other project funding:							
(a) R&D (Engineering Stud.)	$ 400	$ 800	$ 100	$ 0	$ 0	$ 0	$ 1,300
(b) Other Projected Related Cost	0	0	0	0	0	0	0
Total Other Project Funding	$ 400	$ 800	$ 100	$ 0	$ 0	$ 0	$ 1,300
Total Project Funding	$1,770	$ 8,563	$25,100	$28,000	$45,237	$3,360	$111,300

1. Title and location of project: Modifications and Additions to Prototype Facilities

Various locations

2. Project No. 81-T-112

---

12. Schedule of project funding and other related funding requirements (continued)

b. Total related funding requirements (estimated life of project: 20 years)

1. Facility operating costs 0
2. Programmatic operating expenses directly related to the facility 0
3. Capital equipment not related to construction but related to the programmatic effort in the facility 0
4. GPP or other construction related to programmatic effort in the facility 0
5. Other costs

Total other related annual funding and other related funding requirements 0

13. 1. (a) Construction line item

No narrative required

2. (a) R&D (Engineering Studies)

Elements of cost to be charged as R&D expense for conceptual design work include:

(1) preparation of System Design Descriptions (SDD's) which will be utilized for the basis of project design.

(2) performance of geotechnical and other engineering studies to establish system design parameters.

Technical data and other project information developed as a result of this work will provide the basis for Project Preliminary Design (Title I).

DOE/MA-0064/1
VOLUME 2 OF 7

CONGRESSIONAL BUDGET REQUEST

FY 1984

VOLUME 2

ENERGY SUPPLY RESEARCH AND DEVELOPMENT
NUCLEAR WASTE FUND

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

NUCLEAR WASTE FUND

VOLUME 2

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DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	---	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities ..	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration ...	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration .	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration .	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration .	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund .	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	---	-3,331	---	-5,000	---	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	---	---	217,325	179,401	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	---	2,200	2,100	2,100
Special Foreign Currency	---	312	---	---	---	---
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,902,297

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,081	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	---	39,213	---	23,491	---	---
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY

Proposed Appropriation Language

[Energy Supply, Research and Development Activities,
Operating Expenses]

[Energy Supply, Research and Development Activities,
Plant and Capital Equipment]

Energy Supply, Research and Development Activities

For expenses of energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for energy supply, research and development activities and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 19 of which 16 are for replacement only) $2,094,645,000, to remain available until expended.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL.	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL.	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL.	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR . . .	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV	1	1	4
EXECUTIVE LEVEL V			
SUBTOTAL	1	1	4
ES-6	1	1	2
ES-5	17	8	9
ES-4	39	40	42
ES-3	14	8	10
ES-2	14	15	14
ES-1	4	6	6
SUBTOTAL	89	78	83
GS-18			
GS-17			
GS-16	1	1	
GS/GM-15	227	206	202
GS/GM-14	149	136	122
GS/GM-13	87	78	76
GS-12	56	45	55
GS-11	40	46	59
GS-10		1	5
GS-9	30	29	41
GS-8	30	26	23
GS-7	105	88	92
GS-6	120	101	97
GS-5	54	53	51
GS-4	25	26	12
GS-3	10	14	2
GS-2			
GS-1			
SUBTOTAL	934	850	837
UNGRADED	6	6	5
TOTAL PERMANENT POSITIONS	1,030	935	929
UNFILLED POSITIONS, END OF YEAR	15		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	1,015	935	929

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,651
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	190	168	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,338	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,128	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,678	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX EMERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
DOLLARS IN THOUSANDS

	FY 1983	FY 1984
Appropriation	2,432,737	2,094,645
Comparative Transfer From:		
General Science	5,849	—
Departmental Administration	36,715	—
Uranium Enrichment	1,183	—
Comparative Transfers To:		
Nuclear Waste Disposal Fund	-217,325	—
Atomic Energy Defense Activities	-3,700	—
General Science	-12,767	—
Subtotal, Budget Authority	2,242,692	2,094,645
Unobligated Balances, Start of Year .	94,206	123,813
Unobligated Balances, End of Year ...	-123,813	-124,009
Total Available for Obligation	2,213,085	2,094,449

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Solar Energy	268,224	201,935	86,659
Geothermal	69,904	49,628	13,553
Hydropower	3,000	1,000	—
Electric Energy Systems	21,300	17,200	12,702
Energy Storage Systems	38,500	25,700	14,200
Nuclear	1,078,051	815,865	848,192
Environmental, Safety and Health ...	55,347	38,995	40,375
Biological and Environmental Research	211,977	188,220	170,200
Magnetic Fusion	451,231	447,062	467,000
Instrumentation Initiative	—	—	6,000
Basic Energy Sciences	241,183	282,850	350,170
Energy Research Oversight, Analysis, and University Research Support ...	15,299	11,427	11,739
Multi-Program Facilities	33,140	34,000	40,600
In-House Energy Management	23,600	16,000	14,400
Technical Information Center	15,826	15,253	14,100
Plant Engineering and Design	700	700	1,000
Policy and Management	5,360	5,750	3,755
Subtotal, Energy Supply R&D	2,532,642	2,151,585	2,094,645
Transfers from/to Other Accounts ...	-14,540	—	—
Undistributed	—	91,107	—
FY 1981 Deferrals	-142,335	—	—
Total, Energy Supply R&D............	2,375,767	2,242,692	2,094,645

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

SOLAR ENERGY

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW

Solar Energy

The overall goal of the Solar Energy Program is to provide the technology base from which private industry can develop systems for transforming direct sunlight and indirect solar resources into energy forms suitable for widespread use. Attainment of this goal will help to ensure a future supply of adequate and reliable energy which fulfills our Nation's needs. With available tax credits and other incentives, at both the Federal and State level, some solar technologies are becoming competitive with conventional energy resources. For other solar technologies, however, major advances must still be made before viable energy systems can be expected to be produced.

The Federal role in solar energy research is thus to support the achievement of major technological advances where private sector risk perceptions are relatively high, and commercial investment is insufficient to realize the potential benefits to the Nation. The Federally supported solar energy research programs proposed for FY 1984 will focus on developing a technology base from increased scientific understanding gathered through long-term, high-risk research and development. Investigative activities will focus on known shortcomings of current generation technologies, and actual system performance levels. Once these solar technologies have been advanced to a point of reduced risk, the marketplace and private industry will be relied upon to bring these energy developments into eventual commercial use.

For FY 1984, the Solar Energy program will concentrate on solar heat, photovoltaics, wind, and biomass energy technologies which are capable of producing thermal, electrical energy and organic energy feedstocks. In addition, a supporting technical information program is proposed.

The Solar heat technologies program aims to provide the technology base from which the private sector can develop, manufacture and commercialize solar energy systems to heat, cool and light buildings, produce industrial process heat and steam, and generate electricity. Solar heat technologies consist of three major activities: materials research, central receiver technology and heat transfer systems analysis.

The goal of the photovoltaic energy technology program is to advance scientific understanding and establish a technology base needed for the private sector to develop and utilize advanced photovoltaic energy systems for electric generation. Technological advances are needed in order for industry to achieve sustained market penetration in the residential, commercial/industrial, and utility market segments. The program thrust is to address through basic and generic research the principal risks and uncertainties inhibiting private sector activity.

The primary goal of the biomass energy technology program is to establish a technological base for feedstock production and energy conversion which will enable the private sector to develop new energy supply capabilities. The program is investigating the means to increase biomass energy feedstock through species screening and genetic engineering. Attention is also focused on the development of advanced conversion processes capable of producing solid, liquid and gaseous fuels from biomass sources such as wastes, residues and other organic matter. Also this research and development activity concentrates on reducing the technical uncertainties of converting organic matter into alcohol-based fuels.

The major objective of the wind energy technology program is to attain a level of research knowledge and a technology base that will allow the private sector to proceed with confidence to utilize advanced wind energy systems for the generation of electricity. Technological advances, refined engineering/design practices, and better scientific understanding of wind behavior, wind turbine aerodynamics, structural dynamics and environmental impact issues are needed. This will reduce the uncertainty and risks for the industry developing small wind systems for residential and farm applications, as well as large wind turbines for utility electric power systems. The program emphasis is on resolving, through research, the primary technical challenges.

A solar technology transfer activity will assure that the results of Departmental research and development in solar technologies are transmitted to scientists, engineers and decision makers in the private and public sectors.

Personnel assigned to the Solar Energy Program develop technical strategies; manage research and development programs; coordinate and direct activities of contractors, national laboratories and other Federal agencies involved in solar technology programs; and plan and implement resource allocations. Expenses related to the salaries, benefits and travel of these personnel are budgeted under the solar program direction category.

Solar Heat Energy Systems

Prior Year Accomplishments:

- Completed checkout, operation, maintenance and initiated technology validation of the 10 MWe Barstow, Ca. Central Receiver Pilot Plant in accordance with commitments to utility partners and the State of California.
- Progress made in materials research included development of polymers for solar collectors and solid-to-solid phase change materials which are of potential value to space heating; identification of several techniques to light the interiors of buildings; testing of ceramics such as mullite and silicon carbide capable of high temperature operation under a cyclical thermal environment; and definition of high-temperature heat transfer and thermal storage material performance and capabilities.
- Developed and tested high-performance, thin-film collectors. Assessed feasibility of high-temperature phase-change "boiling" collectors.
- Developed and tested four different high-performance solar-assisted heat pumps, Absorption and Rankine solar cooling machines.
- Established data reduction capability to analyze performance of the 10 MWe Central Receiver; completed software development for its automated operation; and turned over this power facility to private ownership operation.
- Conducted research to identify reliable techniques for joining ceramic materials to other ceramics and metals, and evaluated the responses of the junctures to mechanical and thermal stresses.
- Characterized available polymer materials, and identified feasible composition changes to satisfy performance and durability requirements of enclosed concentrators and plastic mirrors.

Photovoltaic Energy Systems

Prior Year Accomplishments:

- Developed analytical measurement techniques capable of identifying problems that occur within and at the interface of advanced material cells.
- Established feasibility of large area amorphous cells which perform at efficiencies greater than 5 percent, and verified laboratory cells having efficiencies greater than 10 percent.
- Established 15 percent efficiency for thin film gallium arsenide on silicon substrate.

- Completed the modification of existing chemical categories III, IV materials theory, and applied it to the study of defects and impurities.
- Narrowed the development of single crystal silicon; and passed results of work in the areas of silicon sheet, silane materials, module sciences, and test methodology to industry.
- Developed and evaluated alternative deposition methods to produce thin-film structures having high efficiency, high performance stability, and yield characteristics.
- Developed module tests and design algorithms to establish 20 year or longer module lifetimes.
- Used results of first generation experiments developed design for advanced concentrator modules. Selected preferred lens design.
- Evaluated results of industrial and residential experiments and transferred that information to industry, utilities, and architects.

Biomass Energy Systems

Prior Year Accomplishments:

- Completed 200 hours of testing of a vertical combustor and cyclone system that uses wood as an alternative fuel for gas turbine operation.
- Completed preliminary techno-economic assessment on the production of medium Btu gas using multi-solid fluid bed technology.
- Completed operation and evaluation of a facility which converted biomass into methane-rich gas at atmospheric conditions.
- Developed an in vitro cell-free system with high photobiological efficiency.
- Studied the mechanisms, thermodynamics, and kinetics of fast pyrolysis employing the molecular-beam-mass spectrometer system for examination of intermediate reaction products.
- Obtained twenty-fold increase in biogas yields for short periods of time using selected nutrient enhancement.
- Obtained yields of 60 dry tons/acre/year for microalgae over a short period of time during high-density outdoor cultivation experiment.
- Isolated bacteria and blue-green algae with high photosynthetic efficiency.
- Determined a hybrid of Black and Eastern Cottonwoods to be most promising for short-rotation silviculture in the Northwest. Yields were obtained up to three times greater than conventional forestry species in the region.
- Examined operating parameters for improving yields of high-value gaseous intermediate from fast pyrolysis reactions.
- Developed techniques for transferring genetic material between methanogenic organisms to ultimately produce enhanced methane yields.
- Defined nutrient conditions required for high rates for methane production.
- Employed basic genetic engineering techniques for enhanced photobiological hydrogen evolution, biological stability and reduced oxygen sensitivity.

Alcohol Fuels

Prior Year Accomplishments:

- Completed acid hydrolysis research.
- Finished design for thermopilic enzymatic hydrolysis.
- Issued final report on the Alcohol Fuels state-of-the-art.

Wind Energy Systems

Prior Year Accomplishments:

- Completed disposition of four Mod-OA's, 200 kilowatt experimental wind turbines and the 2000 kilowatt Mod-1.
- Completed tests on experimental dynamic control effects on turbine behavior.
- Continued development of wind turbine wake models, including validation on small wind turbine arrays.
- Improved and validated generic models for Darrieus vertical axis wind turbines on performance and systems characteristics.
- Investigated hybrid composite material properties for improved structural integrity and ultra-high-cycle fatigue life.
- Validated generic structural analysis computer models which better predict turbine structural responses to wind gusting.
- Improved generic aerodynamics and load prediction models for rotors operating under a wide range of conditions, including wake effects of upwind turbines.
- Developed theoretical model for the wind turbulence spectrum seen by a horizontal axis turbine rotor.

Solar Technology Transfer

Prior Year Accomplishments:

- Issued a basic principles document for one solar technology and initiated preparation of comparable documents for other solar technologies.
- Issued resource and meteorological guides.
- Initiated preparation of final documentation for solar programs approaching completion.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Solar Energy

Energy Supply Research and Development- Operating Expenses
Energy Supply Research and Development- Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Solar Energy (CE)				
Solar heat technologies				
Operating expenses	$ 73,750	$ 60,250	$ 60,250	$ 21,700
Capital equipment	3,300	900	900	250
Construction	1,000 a/	0	0	0
Subtotal	78,050	61,150	61,150	21,950
Photovoltaic energy systems				
Operating expenses	71,000	58,035	58,035	32,700
Capital equipment	3,000 a/	0	0	0
Subtotal	74,000	58,035	58,035	32,700
Biomass energy systems				
Operating expenses	19,500	16,000	16,000	17,300
Capital equipment	1,000	0	0	0
Subtotal	20,500	16,000	16,000	17,300
Alcohol fuels				
Operating expenses	10,000	5,000	5,000	0
Capital equipment	0	0	0	0
Subtotal	10,000	5,000	5,000	0
Wind energy systems				
Operating expenses	33,700	31,300	31,300	8,600
Capital equipment	700	100	100	0
Subtotal	34,400	31,400	31,400	8,600
Ocean energy systems				
Operating expenses	20,300 b/	10,500	10,500	0
Capital equipment	500	0	0	0
Subtotal	20,800	10,500	10,500	0
International solar energy				
Operating expenses	4,000	10,000	10,000	0
Subtotal	4,000	10,000	10,000	0
Solar technology transfer				
Operating expenses	6,700	3,000	3,000	3,100
Subtotal	6,700	3,000	3,000	3,100
Program support				
Operating expenses	3,463	1,000	1,000	0
Subtotal	3,463	1,000	1,000	0
Program direction				
Operating expenses	4,000	5,850	5,850	3,009
Subtotal	4,000	5,850	5,850	3,009
Solar reserve account				
Operating expenses	12,311	0	0	0
Subtotal	12,311	0	0	0
Total				
Operating expenses	258,724	200,935	200,935	86,409
Capital equipment	8,500	1,000	1,000	250
Construction	1,000	0	0	0
Solar energy	$ 268,224 c/	$ 201,935	$ 201,935	$ 86,659
Staffing: FTP/FTE	131/135	87/88	87/88	44/45

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Solar Energy

Energy Supply Research and Development-Operating Expenses
Energy Supply Research and Development-Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

a/ Reflects an approved reprogramming proposal which transferred $1,000,000 from Photovoltaic capital equipment to the Solar Heat Technologies Barstow,CA. 10 MWe Demonstration construction project.

b/ The $10,500,000 Ocean Energy Systems total includes $4,000,000 which was deferred into FY 1983 for OTEC Pilot Experiment Preliminary Design(s).

c/ Decreased by $7,226,000 for the FY 1982 general reduction. The total of $268,224,000 includes $48.9 million deferred by Congress from FY 1981.

Authorization:

- Sec. 5-17; P.L. 93-473 Solar Energy Research, Development and Demonstration Act of 1974.
- P.L. 95-590, Solar Photovoltaic Energy Research, Development and Demonstration Act of 1978.
- P.L. 96-345, Wind Energy Systems Act of 1980.
- Sec. 103; P.L. 93-438 Energy Reorganization Act of 1974.

SUMMARY OF CHANGES
Solar Energy
(In thousands of dollars)

FY 1983 Appropriation enacted		$ 201,935
Built in increases and decreases:		0
FY 1984 base		$ 201,935
Program increases and decreases:		
Solar Heat Technologies		
-Increase in Materials Research	+	600
-Decrease Central Receiver Technology activities	-	18,000
-Decrease Heat Transfer and Systems Analysis	-	800
-Complete funding of Repowering Designs	-	3,000
-Complete Salton Sea Solar Pond project funding	-	2,000
-Funded Second Small Community Experiment	-	3,000
-Turn over operation of Shenandoah Total Energy Project to utility partner	-	1,500
-Complete funding for systems R&D	-	11,500
Subtotal	-	39,200
Photovoltaics		
-Reduce thin film materials research	-	100
-Increase development of high efficiency cells	+	1,300
-Reduce cell theory and analysis	-	600
-Complete testing activities	-	5,200
-Complete silicon material development	-	6,000
-Complete balance of system development	-	9,700
-Complete Sacremento Utility Project	-	2,000
-Complete funding of excimer laser annealing research	-	1,000
-Reduce management analysis and planning	-	2,035
Subtotal	-	25,335
Biomass		
-Increase Thermochemical Conversion research	+	1,700
-Increase Biochemical Conversion investigations	+	8,100
-Decrease Species Identification funding	-	3,400
-Complete funding of Regional Biomass Program	-	4,000
-Reduce other related Biomass energy research activities	-	1,500
Subtotal	+	1,300
Alcohol Fuels		
-Integrate Alcohol Fuels R&D into the Biomass program element	-	5,000
Wind		
-Increase Aerodynamics Research	+	1,300
-Increase Structural Research	+	800
-End engineering development of the Mod-5 Large Scale Turbine	-	18,000
-Complete repair and fund research of the 3-turbine Mod-2 cluster	-	6,000
-Decrease Small-Wind Test Center activities	-	500
-Reduce system planning	-	400
Subtotal	-	22,800

SUMMARY OF CHANGES
Solar Energy
(In thousands of dollars)

(Continued)

Ocean		
-Complete Biofouling and Corrosion Research	-	1,000
-Complete Heat Exchanger Development	-	1,500
-End Coldwater Pipe Development	-	1,500
-Complete Ocean Thermal Energy Conversion (OTEC) Pilot Plant Preliminary designs	-	6,000
-Terminate all other activities	-	500
Subtotal	-	10,500
International Solar		
-Fulfilled U.S.-Saudi Arabian International Cooperative Agreement commitments	-	9,500
-Support International Trade Development activities with past year funds	-	500
Subtotal	-	10,000
Solar Technology Transfer		
-Continue the Solar Information Program, compilation of mandated reports, research document reproduction and distribution activities	+	100
Program Support		
-Activities previously funded under this program element are supported in individual programs in FY 1984	-	1,000
Program Direction		
-Decrease staffing level from 88 to 45 total Full-Time Equivalent (FTE) positions	-	2,841
FY 1984 budget request	$	86,659

Solar Heat Technologies

The FY 1984 request is $21,950,000. Solar Heat Technologies consists of the three following subelements: Materials Research; Central Receiver Technology; and Heat Transfer Systems Analysis.

Solar Heat Technologies pertain to the conversion of solar energy into useful thermal energy at temperatures ranging from near ambient to over 2500° F. The many significant advances that have been made in these technologies have made it possible for industry to introduce a range of new products, i.e., solar domestic water heaters, space heating systems, and industrial process heat systems. Focus is now shifted toward long-range, high-risk research and toward those vital technological advances that the private sector is unable to do on its own. By concentrating on this type of research, the opportunity arises to describe the program in its two fundamental areas, materials research and thermal sciences research including heat transfer systems analysis. Research in these two basic areas will be applied to various solar heat technologies. A third program area, central receiver technology, performs research and development on technical issues essential to the widespread acceptance of this application. The goal of the Solar Heat Technologies program is to provide the technology base from which the private sector can develop, manufacture, and commercialize solar energy systems to heat, cool and light buildings, produce industrial heat and steam, and generate electricity.

Material Research $11,750,000

The materials research embodied in the budget request for FY 1984 and the outyears focuses on optical materials (such as polymer films for high transmission glazings and reflectors) and on coatings to improve the insulation value of windows or collectors glazing or to allow control of solar or thermal radiation. Thermal materials for absorption, transmission, and storage of energy in both high-temperature industrial or power applications and lower-temperature buildings applications are also emphasized.

The $11,750,000 requested for FY 1984 will fund the following activities:

o Thermal Materials Research (High Temperature): ($4,000,000)

Conduct assessment of existing materials for ability to withstand the high temperature and high flux environments that characterize the most thermodynamically efficient use of solar thermal energy for electric power production and fuel and chemical production processes. Materials now being used for these solar applications at temperatures above 1500° F or flux levels above 1 MW per square meter consist of prohibitively costly exotic alloys, ceramics with unacceptable short service lives and low reliability, and transparent materials (windows) that are strongly sensitive to cracking under thermal stress. To reduce the impact of these difficulities, research will be performed to: determine rheological (deformational) and optical properties of best candidate materials; analyze sensitivities to transient thermal stresses in central receiver design; and identify reliable methods of joining ceramics to other ceramics and metals; and determine optical and mechanical performance characteristics of window materials for direct radiation applications.

o Polymer Concentrator Materials Research: ($500,000)

Conduct research on high strength, high transmittance ultra-violet stable polymers, develop and analyze performance of high reflectivity metallized polymer reflectors for enclosed and innovative solar heat heliostat or dish concentrator applications.

- Collector Materials: ($1,225,000)

Develop new low-cost, high-performance polymer and plastic/metal laminates for low and medium-temperature collectors. Polymer based on low-cost resins are candidates for chemical and physical modification. There is a critical need for low-cost, durable light-weight materials that can be used in solar collectors without loss of performance. Successful research could provide a breakthrough in collector development since fabrication and installation costs would be reduced by as much as 80 percent.

- Heat Transfer Materials and Fluids: ($650,000)

Develop thermal transfer and working fluids capable of improving the performance and durability of low and medium temperature solar collection and heat transfer subsystems and coefficient of performance capable of providing the reliability of Rankine and absorption cycle machines for solar cooling or heat pump applications. Heat transfer fluids in current use include water, synthetic oils, water/glycol solutions and air. Each has significant shortcomings. There is a critical need to improve current fluids and/or develop new fluids with enhanced properties of low viscosity, high thermal capacity, inertness, freeze resistance, and environmental soundness at acceptable cost.

Develop materials for enhanced and controlled heat transfer in buildings to provide optimal control over heat transfer rates at the low temperatures and low temperature differences typically experienced in passive solar buildings.

- Desiccants and Thermal Storage Materials: ($2,275,000)

Investigate and characterize the properties of new desiccants and solid-to-solid phase change materials for use in lowering the latent cooling loads of conditioned buildings. The ability to regenerate dehumidification systems will have a considerable impact on buildings in geographic areas with high humidity. These materials will be used in conjunction with daylighting systems in non-residential buildings.

Develop innovative storage and containment materials capable of providing reliable, long-lifetime, high performance to meet critical need for stable, low-cost latent heat (phase change) storage materials applicable to low and high temperatures (90-300° F). For solar cooling systems, latent storage offers the promise of more optimal thermodynamic coupling (e.g., constant temperature matching) with the collection array, and a means of minimizing heat and parasitic energy losses.

Develop improved desiccant materials for use in solar regenerated cooling and/or dehumidification systems that will: enable systems to achieve significantly improved thermal coefficients of performance; reduce material requirements of solar regenerated desiccants; and permit the use of low cost system components such as open flow low-temperature collectors, which may prove more suitable to meet comfort conditioning requirements.

- High Transmission, High Insulation Glazing Materials: ($1,100,000)

Develop glazing materials that allow high transmission of visual spectrum light and yet provide high insulation capability. Successful research in this area would represent a major accomplishment in reducing convective and conductive heat losses through a building's structural envelope and thus substantially increase the potential for solar contributions to the building's energy needs.

- Aperture Materials Research: ($2,000,000)

  Conduct research on controllable glazings to give structures the flexibility to accept or reject solar radiations as the situation requires. These glazings consist of optical filtering materials capable of transmitting only the visible portion of the light spectrum; optical switching materials which can control the direction and transmission of incident solar radiation. Control of the direction of solar radiation will permit natural lighting to any part of the building. Control over the amount, spectrum and direction of transmitted radiation will prevent overheating, reduce normal cooling loads, and permit practical daylighting.

Central Receiver Technology $7,200,000

Central receiver technology has application in centralized electric generation and possibly in industrial process heating. The goal of this element of the program is to help development of the technology base necessary for the introduction of large private systems. The 10 MWe Pilot Plant at Barstow, CA. is the centerpiece of the program, which also includes the supporting, testing and development of components essential for establishing the technical feasibility and flexibility of the technology.

- Central Receiver Test Facility: ($2,000,000)

  The Central Receiver Test Facility is the primary solar test facility for component and subsystem evaluation within the central receiver program. It also provides valuable system information on integration between heliostats, receivers, and the associated controls. The FY 1984 funding will support staffing and maintenance of the facility, automatic controls development and continuation of test activities.

- Advanced Development of Thermal Subsystems: ($1,200,000)

  Conduct research to resolve the technical risks associated with scaling up relatively small central receiver design to limited industrial process heat (IPH) plant size. Design, fabrication, and testing of representative components and subsystems will be performed to ascertain materials and assembly integrity, fluid flow characteristics, and control of the system under continuous and transient solar and radiant heat conditions. Components for steam and air applications will be tested. Feasibility and cost of long-term and/or high temperature storage will be determined.

- 10 MWe Central Receiver Pilot Plant: ($4,000,000)

  Continue operation of the 10 MWe Receiver Pilot Plant at Barstow, CA, in a utility grid-connected application to validate software development and automated operation into the power production phase. Collect data from the 10 MWe Pilot Plant to examine further operational, reliability, economics, and environmental effects, validate the technical operation of central receiver power generation and determine the operational and maintenance economics.

Heat Transfer Systems Analysis $3,000,000

Although cost considerations dominate the question of commercial readiness of solar thermal technologies, thermal performance remains the central technical issue for most designers, manufacturers and users. Only very recently have solar systems of appropriate size, credible design and adequate instrumentation become available for monitoring and study. The monitoring of these systems, coupled with research into the basic heat transfer processes that determine system performance is essential for an adequate understanding and design capability.

The heat transfer research and analysis included in the FY 1984 budget request emphasizes performance of systems and the analysis and measurement of radiation and convective processes for daylighting and for thermal transport in solar buildings.

o Thermal Performance Monitoring: ($1,400,000)

Collect, assess and disseminate information on thermal performance, operation, maintenance and durability of prototype experimental systems for use by researchers, engineers and manufacturers involved in developing low and medium temperature solar systems. There continues to be a need to monitor performance of installed systems to ensure adequate up-to-date knowledge and feedback of state-of-the-art systems. Funding requested would allow for monitoring of 40 Federal/private cost-shared projects, and 4 SOLERAS (US-Arabia) sites and would allow the program to publish comparative performance reports on heating, cooling and hot water systems.

o Daylighting Resource Assessment and Model Measurement: ($1,100,000)

A major energy use factor in non-residential buildings is lighting. The need for lighting in the workspace also impacts the cooling load on these load-dominated structures. Hence, a reduction of the lighting demand not only reduces the lighting energy needs, it also reduces cooling energy requirements. The budget includes funds to measure the available solar illumination at representative locations throughout the country. These measurements will be correlated with local data on cloud cover extent, type, and solar energy availability, so that existing design data bases can be used for daylighting calculations. Also proposed is work to model the measurements resulting from a variety of daylighting systems. Both light quality and level must be understood for beam and diffuse lighting systems.

o Basic Heat Transfer Research - Heat Transfer Rates: ($200,000)

The low temperature differentials which occur in passive systems require examination of the complex coupled heat and mass transfer processes which determine system performance. Plan to conduct empirical and analytic examinations of heat transfer rates under the range of temperature differentials common to buildings and their environment.

o Planning and Assessment: ($300,000)

The planning and assessment activity will maintain a planning horizon to guide solar heat R&D activities, assimilate results of these activities to monitor progress toward attaining program objectives, and analyze and evaluate the merits of proposed research and development.

Photovoltaic Energy Systems

The FY 1984 request for Photovoltaic Energy Systems totals $32,700,000. This program element consists of three subcategories: Material Research; Cell Theory and Validation Studies; and Analysis, Testing and Reliability Studies.

Materials Research $20,500,000

All materials for use in solar cells have either high energy consumption in purification and layer deposition and/or imperfections in the semiconductor structure that diminish the final solar cell's ability to convert photons to electrons efficiently. Semiconductor crystal silicon has the highest early promise of producing electricity at a cost that will be competitive in certain, high cost, electricity markets. In the longer term, amorphous silicon, other polycrystalline materials and multi-layer cascade devices have the potential to produce electricity that could be competitive with alternative sources.

For photovoltaic systems to make a large impact upon the electric power market, in particular the residential and utility markets, it is essential that the price of photovoltaic modules and installed systems be reduced by at least a factor of five. This will generally require that industry adopt more advanced technology that can attain module costs of about 70¢ per peak watt for residential applications and about 40¢ per peak watt for utility applications. The scientific feasibility for advanced photovoltaic cells, particularly those based upon thin-film, high-efficiency materials, needs to be established if industry is to be able to achieve these lower costs.

Materials properties, particularly in the thin film, large area layers required, need to be characterized and improved for effective use as engineering materials in advanced systems. Materials classes include amorphous (a-)silicon:hydrogen, a-silicon carbide: hydrogen, a-silicon: germanium:hydrogen, a-silicon:tin:hydrogen, a-boron:hydrogen, etc.; and polycrystalline cadmium zinc sulphide, copper indium diselenide, copper selenide, cadmium telluride, zinc phosphide, etc. In addition, multi-layer, single crystals, and luminescent materials, as well as conductors, insulators, and widebandgap semiconductors, need to be characterized and improved for use as engineering materials in advanced systems.

The amount requested for FY 1984 will allow the following activities to be conducted:

- Thin-Film Materials and Cell Research ($11,200,000)
    - Amorphous Materials: Conduct research on deposition methods for producing amorphous photovoltaic cells having high efficiency, durability, reliability and potentially low cost; understanding of deposition by glow discharge, sputtering, chemical, etc., methods suitable for producing uniform, large-area cells; and characterization of produced films as a function of deposition conditions, such as plasma dynamics, substrate temperatures, gaseous pressures, etc. Special laboratory measurements, model development and film characterization and analysis is needed on interfaces between dissimilar amorphous materials and window and conductive films, such as indium tin oxide.
    - Polycrystalline Materials: Carry out research on the characterization and improvement of thin film materials and deposition techniques for thin film polycrystalline materials such as cadmium zinc sulphide/copper indium diselenide, zinc phosphide, cadmium telluride, etc. Carry out research on the theoretical design and design validation of new cell structures using these films and on processes to realize the design objectives.

- High-Efficiency Material and Cell Research ($9,300,000)

  -- Multi-layer, Single Crystal, Cascade Cell Materials Research: Carry out research on the characterization and improvement of monolithic multi-layered single crystal materials for multibandgap cells. This includes materials such as silicon, gallium aluminum arsenide, etc. using such coupling techniques as tunnel junctions, superlattice structures and metallic interconnect schemes. Critical materials minimization by thin film growth on foreign substrates and by thin layer separation techniques will be studied. Carry out research on theoretical designs for advanced cell structures. Experimentally validate these designs and methods of attaining them.

  -- Materials Research for Advanced Cell Concepts: Carry out research on new metallization concepts, insulators and widebandgap semiconductors for use in a wide range of solar cell devices. These studies are generic in nature having application in a number of areas, and address the need for non-contaminating/effective conducting metallization and antireflective coatings from abundant, non-critical materials.

  -- Luminescent Materials and Concentrator Research: Carry out research on the efficiency, control of frequency down-shift and durability of luminescent materials and their hosts. This includes research on the theoretical design and design validation of device concepts using organic and inorganic materials.

Cell Theory and Validation Studies $5,700,000

Analytical models and improved theoretical methods for predicting the performance and charactertics of many new materials for photovoltaic conversion devices are critical areas of need for development of advanced, lower-cost cells. This includes a theoretical understanding of devices based upon polycrystalline silicon, amorphous silicon, cadmium telluride, thin-film crystalline silicon, ternary thin-film materials, etc. Theory and models for new conversion concepts, such as multijunction cells, luminescent concentrator devices, and photoelectrochemical materials and processes also require advancement.

Cell reliability studies are nearly as fundamental as new material investigations and are required in the earliest phases of R&D on new materials and concepts. Early discrimination of materials and structures which do not have intrinsic reliability will increase research productivity.

The amount requested for FY 1984 will allow the following activities to be conducted:

-- Theory, Modelling and Analysis: Conduct activities required to achieve scientific understanding and theoretical framework for amorphous silicon, thin-film materials, and other advanced cell concepts.

-- Cell Reliability: Conduct analyses and tests on the conceptual designs and sample structures for new photovoltaic cells for potential degradation mechanisms. The results will either confirm the validity of the design or suggest alternatives for future research. The work will also result in models for accelerated life testing to ensure that abnormal failure modes are not introduced by this stress testing.

-- Measurement techniques: Carry out research on the development and application of new measurement techniques required to throw light on the current research problems. A typical problem is detecting foreign atoms at one part in a million or less concentration in layers only a few atoms thick. These basic research studies are generic in nature and have application in a number of areas.

Analysis, Testing and Reliability Studies $6,500,000

Commercial modules are manufactured in various mechanical and electrical configurations. No cohesive body of knowledge exists on how to design and build, with certainity, modules that will last twenty to thirty years. Failure mechanisms are only beginning to be properly understood and will be understood adequately only after large samples of various configurations are studied in detail (infra-red scans, visual magnifications, etc.).

Recent results from on-going field testing of systems have identified the need to develop accelerated testing procedures and conduct failure mode analysis dealing with temperature-humidity effects and cycling, ultra-violet radiation damage, electrical insulation materials and electroplating degradation within cells. There is also a need to verify results of accelerated test procedures and analysis against results from field installations. Confidence must also exist that a system will operate for the promised span of time before potential users would make a buy decision, particularly multi-million dollar decisions such as the utilities may make. The data base being developed on lifetime validation will develop this confidence. All new materials and technologies will also be assessed to assure that environmental, health and safety concerns are adequately addressed.

The amount requested for FY 1984 will allow the following activities to be conducted:

-- Reliability Studies: Collect and analyze data on a statistically significant number of cells and modules of differing configurations. These efforts will develop a body of knowledge that permits making correct inferences on module lifetimes as well as developing the models that will ensure maximum cost-effective longevity of modules.

-- Accelerated Testing Methods: Conduct accelerated testing and analysis for flat-plate cells and modules, concentrator cells and modules and new materials and cells, respectively. This includes development and application of test procedures and analyses, identification of new failure modes and potential adjustments to product failures, and liaison with industrial producers and market participants (users).

-- Systems Lifetime Validation: Record, reduce and synthesize data from residential, intermediate and central station projects to determine if projected lifetimes (20 to 30 years) can be met.

-- Environmental Testing: Test succeeding generations of modules in sites adjacent to earlier modules already under test and document failure modes experienced for feedback into module design activities.

-- Environmental, Health and Safety (EH&S): Examine processes and materials currently in development in relation to similar on going production modes for potential EH&S problems. This will help establish methods of quantifying, avoiding, or nullifying these potential EH&S effects.

Biomass Energy Systems

For FY 1984 a total of $17,300,000 is being requested. The former separate solar energy program elements, Biomass Energy Systems, and Alcohol Fuels R&D, now have been combined with the Energy Conservation Urban Waste Activity to form a new consolidated Biomass program element. This research effort consists of three subcategories: thermochemical conversion, biochemical conversion, and production.

Thermochemical Conversion...$4,200,000

This effort will involve the determination, at the molecular level, of the mechanisms, thermodynamics, and kinetics associated with thermochemical conversion processes. Projects will focus on pyrolysis of organic materials for high-value gaseous and liquid fuels, examination of single stage conversion of woody organics to methane, and the understanding of biomass direct combustion of biomass based on combustion theory for homogeneous polymers. Research will be performed on gasification in a high pressure reactor for subsequent synthesis of liquid fuels. The variation of product gases with feed, moisture, throughput rate, and steam conditions will be examined. DOE will also develop and field test novel emission control technologies for the removal of noxious pollutants specifically generated by biomass waste combustion. The results of these fundamental research efforts will contribute to the generic technology base for the thermochemical conversion of biomass feedstocks.

The specific FY 1984 activities that will be conducted at the President's Request include the following:

- Pyrolysis will be examined under carefully controlled but realistic laboratory conditions, to provide a firm foundation for understanding the process at the molecular level. The molecular-beam-mass spectrometer system will be used to examine the dependence of primary and secondary reactions. Solid phase pyrolysis chemistry will be examined to determine products, rates, and mechanisms encountered at elevated temperatures. Volatile matter evolved by the solid phase pyrolysis reactions may participate in various gas phase reactions depending upon gas phase temperatures, concentrations, rates of heat transfer and residence times. Pyrolysis parameters will be investigated, as will the vapor cracking necessary to produce olefins, precursors to gasoline, or liquid fuels. ($1,000,000).

- Methane production from woody biomass by catalytic reaction with steam will be studied. A three phase fluidized bed reactor without the use of oxygen will be examined. In this particular concept, gasification is catalyzed by wood ash produced in the process. A nickel catalyst will be examined for methanation of the intermediate gases. Experimentation will be with temperatures in the range 1000-1300° F under a pressure of 500-1000 pounds per square inch ($500,000)

- Adaption of combustion theory for homogeneous polymers to complex heterogeneous polymers such as lignocellulosic materials will be attempted. Observations of biomass direct combustion will provide a scientific basis for understanding and improving combustion processes. ($500,000)

- Gasification process research activities will be directed towards the production of medium-Btu gases from biomass. These gases have potential applications in any end use which currently utilizes natural gas or oil. Further work will be performed to determine oxygen requirements for gasification. In the area of catalytic processes, further research will examine the production of suitable gaseous mixtures which are capable of reducing the need for further costly processing. ($1,900,000)

- Novel emission control technologies for the removal of noxious pollutants from biomass combustion will be developed and field tested. Data concerning design characterization of various solids conversion facilities will be gathered and organized for dissemination. ($300,000)

Biochemical Conversion..$12,100,000

This program element will study the physiology/biochemistry of microorganisms, and the development of anaerobic digestion and conversion fermentation processes. Efforts will focus on genetic engineering for improved methane and liquid fuels produced from microorganisms. Nutritional requirements of anaerobic digestors will be studied to improve methane yields and enhance reactor stability. Work will also be conducted on pretreatment to improve digestability of feedstock, and separation and recovery methods for enhanced product concentration. Agency biochemical research for FY 1984 will complement anticipated industry efforts in biomass energy.

The specific FY 1984 activities that will be conducted at the President's Request include the following:

- Experiments to characterize hydrogen biochemical conversion systems and and to determine the source of reactions of hydrogen ions. Key process rate limiting enzymes involved in lipid metabolism will be isolated and characterized. Feasible methane producing processes will be clarified. Enzymes involved in the metabolism of five-carbon sugars will also be studied. ($1,000,000)

- Experiments to characterize bacterial chromosomes involved in conversion of biomass to energy. This information will be used to develop organisms which are capable of storing 80 percent lipids, to study methanogens which can convert high concentrations of acidic digester intermediates to methane, and to investigate organisms that can digest and convert both hemicellulose as well as cellulose. ($1,000,000)

- Research on the nonresponsive nature of lignocellulosic materials to discover how the cellulose can be accessible for hydrolysis to glucose. ($1,000,000)

- Selection and improvement of microbial strains to increase liquid fuel production. After identification of these species, nutritional characterizations will be conducted to optimize the growth of these organisms. ($3,600,000)

- Applied research on the improvement of microbial strains, cost-effective pretreatment methods, the study of nutritional requirements necessary to enhance yields and reduce the time for digestion. ($1,500,000)

- An examination of both mesophilic (mild temperature) and thermophilic (high temperature) enzymatic systems for conversion of biomass to liquid fuels. Single organisms will be sought that both hydrolyze biomass and convert intermediate reaction results to liquid fuels. ($3,000,000)

- A study of techniques capable of providing for the efficient separation/ recovery of liquid fuels. ($1,000,000)

Production..$1,000,000

The major obstacles in microalgal feedstock production are the identification of the most promising species for high sustained yields and the development of optimal cultural and processing methods suitable for these species.

Screening studies of microalgae will be conducted in the laboratory and small-scale field experiments to obtain reliable research data on the potential of selected species to provide high sustained yields of high-valued oils.

The specific FY 1984 activities that will be conducted at the President's Request include the following:

- Screening studies of microalgae in the laboratory and in small-scale field experiments. These efforts will provide reliable research data on the potential of species to provide sustained yields of biomass biomass and energy intensive products. The data base will be used to select or identify the best species for further research. ($1,000,000)

Wind Energy Systems

The budget request for FY 1984 is $8,600,000. The three major Wind Energy subelements consist of Aerodynamic Research, Structural Research and the Small Wind System Test Center.

Aerodynamics Research $3,600,000

While the wind provides the basic source of energy for power production, it also induces structural stresses and a variety of loads on wind machines. The airfoil-shaped rotor blades convert the wind into mechanical energy which is used to turn a generator. The rotation of these large rotors, combined with the constantly varying wind forces acting on them, create substantial dynamic stresses. These airfoils work in flow regimes, atmospheric conditions and with gravity-induced loads which are totally different from those of airplane wings and helicopter rotors; thus much of the data and knowledge from standard aeronautics research is not applicable to wind turbine operations. The wind is extremely variable over short time periods (seconds and minutes) and short distances (within the turbine rotor disc). Little is known about the stochastic nature of the wind and its interaction with turbine rotors on these scales, and how they are affected by climatic conditions, turbulence, terrain, and other variables. Improved generic analytical techniques should allow designers to improve machine performance an additional 20 to 30 percent, extend blade life expectancy by 2 to 4 times the results achieved in field tests, and incorporate improved features such as aileron-controlled rotors and stall controlled, fixed-pitch rotors with no movable control surfaces.

FY 1984 funding is needed to refine analytical techniques and designs and to validate, through experimentation and testing, previously developed models and codes. Test results on experimental turbines have shown energy capture and blade stall characteristics (peak power limits) which are inconsistent with theoretical models. Thus, research will be pursued to advance understanding of those aerodynamic and technology factors which most affect the performance and reliability of wind energy conversion systems. At the same time, additional research and testing will be devoted to those advanced technology concepts and issues (e.g., the dynamic inducer tip vane system) identified through earlier engineering and technology development activities. This work is generic in nature and would be perceived as too risky or long range for the private sector to undertake without government support.

The FY 1984 request will allow the following activities to be conducted:

o Large Horizontal Axis Systems Research ($1,800,000)

Innovative Augmentation Devices: The design, fabrication and installation of a test rotor with a selected augmentation device, expected to be the dynamic inducer tip vane system, will be accomplished. Preliminary experiments will be conducted to determine the device's effect on such factors as energy capture, structural loads, system reliability and noise levels.

- 3-Dimensional Rotor Flow Characterization: Experimental measurements of 3-dimensional air flow and air pressure distributions over advanced rotor blade airfoils, and reduction and processing of the acquired data are being initiated in late FY 1983. Detailed analysis of data and improvement of theoretical models will be performed and reported in FY 1984 to complete this project.

- Wide Range High Lift/Drag Ratio Airfoils: Experimental rotor blades will be designed and tested on the NASA Mod-0 research turbine to evaluate performance of rotors that could potentially improve aerodynamic characteristics and lift-to-drag ratios to 100 or even 150 (up to double the performance of today's blades). The blades will be instrumented and installed on the Mod-0, and experiments will be conducted to measure a variety of performance parameters. Data reduction, processing and analysis will be completed and used to prepare a report on this project.

- Aerodynamic Methods to Prevent Rotor Overspeed: Modification to an existing rotor tip control unit, to investigate the use of aerodynamic forces for passive and controlled blade tip pitch rates, is being initiated during FY 1983. Data analysis and reduction, using information from experiments conducted with this unit on the Mod-0 research turbine and from wind tunnel model tests of a similarly designed rotor unit operating under various wind and machine loading conditions, will be completed in FY 1984.

- Variable Speed Rotor Performance: The feasibility of using high performance fixed-pitch variable speed rotors will be investigated on the Mod-0 research turbine. Installation of the experimental high performance, stall-controlled rotor, data gathering and analysis will be accomplished.

o Darrieus Vertical Axis Systems Research ($1,200,000)

  - Dynamic Stall Characterization and Verification: The computer models now being developed will be verified through dynamic wind tunnel testing of a number of blade element sections incorporating the range of parameters appropriate to the Darrieus application. Approximate relations and/or curve fits will be generated so that dynamic stall information can be developed and analyzed.

  - Advanced Aerodynamics Models: The loads/performance model development/verification/documentation project will center on the double-pass multiple streamtube concept but also consider momentum/vortex hybrids and pure vortex models. Appropriate physics will be included and computational simplicity emphasized. Verification will be through the use of DOE research turbines and those built by industry and universities.

  - Research Testing of Laminar Flow Blades: This project consists of continued operation of the 2, 5 and 17-meter Darrieus vertical axis experimental turbines for use as instrumented facilities for research. Modification and tests will be conducted on new concepts, such as laminar flow blades.

  - Aerodynamics Pumped Spoiling: This aerodynamic overspeed torque limiting concept will be investigated to enhance system survivability and reduce the size of mechanical braking systems. Various blade perforation schemes will be evaluated through wind tunnel and prototype system testing.

- Environmental Research ($300,000)

  - Acoustic Model Validation Tests: Cooperative programs will be conducted to compile acoustic data on annoyance potential at various commercial wind turbine sites. This will enable validation of noise prediction and propagation models previously developed for various wind turbine configurations, terrain and environmental conditions. Portable acoustic measuring equipment will be used to gather data which will be used to verify or refine existing models.

- Atmospheric Fluid Dynamics ($300,000)

  - Turbine Wake Measurements: A comprehensive turbine wake measurement program will be conducted using time-of-flight laser anemometry and other techniques, to provide turbulence dissipation data under a variety of wind and weather conditions. This testing will be used to validate and improve theoretical models of wake propagation and dissipation developed under U. S. and foreign wind energy research programs.

  - Cluster Array Model: A cluster array model will be developed which provides reliable machine wake and performance predictions based on intermachine spacing and a variety of terrain, weather and wind conditions. The model will be validated on a large turbine array.

Structural Research.. $3,500,000

Large wind turbines represent the biggest rotating objects ever made. Rotor blades experience one to two orders of magnitude more high-level cyclical loads in their lifetimes than structures such as bridges and aircraft wings. They have very low resonant frequencies and experience substantial stresses and large deflections. The vibrations of the structural members, the constantly varying wind forces and the rotation of the blades can couple in a way that amplifies loads and stresses. Under resonant conditions these amplified dynamic loads can cause structural problems. The current ability to analyze and calculate natural frequencies, harmonics, and load amplification is not adequate to predict confidently the structural performance of new variable speed machines. Also, the currently available techniques for projecting the fatigue life of the materials and various blade design concepts produce uncertain results.

The amount requested for FY 1984 will allow the following activities to be conducted:

- Darrieus Vertical Axis Systems Research ($1,900,000)

  - Advanced Structural Dynamic Models: The basic project will consist of obtaining structural confirmation data from the Federal test program, as well as data from private industry hardware where appropriate. These data will be used to assess the accuracy and completeness of our analytical models. It is anticipated that analysis refinement will be necessary following comparison with the data base.

  - Fatigue Research : This project will consist of obtaining test data from current Darrieus research test facilities and from instrumented commercial installations where appropriate. Systems studies, data analysis, critical component testing, and development of life prediction models will be performed.

  - System Testing: The project will consist of maintaining the operation of the 100 kW Darrieus research turbine and its instrumented system; effecting continuous monitoring of all aspects of system performance; installing and evaluating an advanced braking system which has already been designed; and transferring the technical data to the engineering community and to other participants in the program.

  - Verification of Advanced Systems Models: Test data from privately developed Darrieus prototypes will be collected and used to validate and upgrade models for differing sizes, flow fields and other parameters. This will permit verification for a system size (about 500 kilowatts) not otherwise available to the Government.

- Large Horizontal Axis Systems Research ($1,000,000)

  - Variable Speed Generator Effects on Drive Train Response: Experimental data will be developed on the effects of variable speed generators on drive train torsional oscillations and system dynamic response. A series of experiments will be conducted on the Mod-0 research turbine using a new cycloconverter-controlled variable speed generator.

  - Real Time Domain Hybrid System Simulation: A wind turbine simulator (hybrid analog/digital computer simulator) will be developed which is capable of simulating all the features of advanced wind turbine designs including flexible towers, free yaw, teetering, and various drive train configurations including variable speed generators.

  - NASA Mod-0 100 kW Research Turbine: The instrumentation and data logging system will be maintained on the NASA research wind turbine at Plumbrook, Ohio to permit research tests planned under separate projects to be performed.

- Wind Energy Systems Act Studies/Report ($300,000)
  - Management Plan and Studies: The Wind Energy Systems Act (Public Law 96-345) requires annual preparation of the Comprehensive Program Management Plan for the Wind Program. This plan provides the framework for long-range, high risk, potentially high payoff research intended to assist industry in the design and operation of wind turbines.
- Atmospheric Fluid Dynamics ($300,000)
  - Microscale Wind Parameters: Data on microscale wind variations will be collected and analyzed to improve the scientific understanding of the causes and characteristics of gusts and small-scale natural wind vortices, the extent to which they are affected by atmospheric stability conditions and topography, and their effect on turbine structural loads and performance. Also supported will be the development of models for estimating the wind variability experienced by a rotating turbine and the effects of microscale wind variations on loads and fatigue life of different classes of turbines under a range of operating environments.

Small Wind Systems Test Center $1,500,000

Current wind system technology requires improvement in the areas of performance, reliability, safety, and reducing noise prior to widespread acceptance as commercial products. Generic analytical tools and data are needed for structural and aerodynamic design of small wind turbines. Supporting a test facility for use by the wind systems industry, utility industry, universities, and other research labs will result in the design and development of safer, more efficient, and more reliable wind machines by private industry.

The amount requested for FY 1984 will allow the establishment of a minimum sustaining level of support for operation and maintenance of the Rocky Flats Wind System Test Center for industry, certification agencies, and other research organizations to secure testing services on a fee-paid basis. As time progresses, it is anticipated that the need for Federal support will diminish as revenues increase from commercial system test fees and as the industry matures and more capital is available for private test activities.

Solar Technology Transfer*

A total of $3,100,000 is being requested for Solar Technology Transfer. This program element is composed of the Solar Technical Information, Reproduction and Distribution, and Mandated Reports categories.

The goal of Solar Technology Transfer is to assure that results of long-term, high risk solar energy research and development activities sponsored by the Department are made available to scientists, engineers and decision makers in the private and public sectors.

Solar Technical Information	$2,500,000

Funds requested will provide for product planning, data compilation, research interface and quality assurance, information product development and product transfer services. For documents to be printed, camera-ready masters will be produced for duplication elsewhere. A centralized technical information office will package the results of all solar energy R&D regardless of a researcher's geographic location.

Reproduction and Distribution....................................	$ 300,000

Funding requested will be used for printing, abstracting, preparation of microfiche copies, and distribution of reports and documents.

Mandated Reports..	$ 300,000

Funds are being requested for fulfillment of report requirements mandated by law, for example the compiling of annual technology reports, and the "Comprehensive Program and Plan for Federal Energy Education, Extension and Information Activities" publication.

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* In FY 1982 and FY 1983 this program element was entitled "Solar Information Systems".

Program Direction.. $ 3,009,000

The requested FY 1984 Solar Energy Program would require a staff of 45 Full-Time Equivalent (FTE) positions. A budget allocation of $3,009,000 is therefore being proposed to fund this level of personnel.

Staff assigned to the Department's Solar Energy Program have responsibility for proposing strategies, adapting research plans to changing requirements, and coordinating the actions of contractors and other Federal employees in implementing solar technology development activities. To perform these tasks requires diverse technical and administrative capabilities. Duties include technical evaluation and control, contract and budget management, and general administrative functions.

The requested level of personnel is needed to effectively manage a proposed Solar Energy research budget, exclusive of Program Direction, totalling $83,650,000. The Solar Energy staff will direct and coordinate Federal sponsored research efforts in the areas of solar heat materials, experimental central receiver operations, advanced photovoltaic R&D, aerodynamic and wind structural research, thermo- and bio-chemical conversion investigations, and technical information dissemination.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Materials Research	o High Temperature Thermal Materials - Screen, select materials, and design high flux ceramic receiver/reactor - Evaluate thermocyclic central receiver high temperature storage concepts - Evaluate transmissitivity and thermal stress distribution of receiver windows in non-uniform flux distribution - Evaluate high temperature low remittance through receiver materials - High Temperature Thermal capital equipment	- Research will be conducted on heat transfer fluids, energy containment materials, thermo-optical receivers and absorbers. Also will perform research on ceramics for high temperature operations, and joining capabilities
	o Polymer Concentrators - Test state-of-the art transmitting polymer degradation, test and evaluate aluminized and silver reflectors, and evaluate epoxy graphic polymeric materials for high optical accuracy concentrators	- Conduct research on high transmittence ultra-violet stable polymers. Analyze the reflectivity of metallized polymer reflectors
	- Investigate issues of durability and resistance to temperature, photodegradation, and abrasion of low cost polymer/foil laminates and other advanced concepts	o Collector Materials - Develop low-cost high performance polymer and plastic/metal laminates for collectors - Improve collector coatings
	- Develop and test coatings for glazings and absorbers for collectors - Investigate materials with one-way reversible thermal transport properties	o Heat Transfer Fluids and Materials - Develop thermal transfer and working fluids for collectors and heat transfer subsystems - Investigate inverted heat pipe materials capable of self-pumping vapor phase heat transport

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	**Estimated Activities During FY 1983**	**Planned Activities During FY 1984**
	- Investigate encapsulation techniques for thermal storage materials - Test and evaluate performance of advanced solid-desiccant dehumidifier designs and explore absorption behavior of silica gel - Investigate solid-to-solid thermal storage materials	o Thermal Storage and Desiccant Materials - Develop low-cost storage and containment materials - Develop desiccant materials for active solar regenerated cooling and/or dehumidification systems - Also investigate new improved desiccant properties and solid-to solid phase change materials
	o Research in transparent microporous glazing materials and other insulating techniques	o High Transmission High Insulation Glazing Materials - Develop glazing materials that allow high transmission of visual light and yet provide high insulation capability
	o Investigate materials with spectral selectivity and switchable techniques	o Aperture Materials - Perform research into glazing materials for light transmission and insulation capabilities - Develop controllable glazing for solar radiation variation
Central Receiver Technology	o Central Receiver Test Facility - Test and evaluate second generation heliostats, advanced molten salt receivers, storm generators and salt storage	- Test components and subsystems such as heliostats and central receivers, and gain facility operating experience

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	**Estimated Activities During FY 1983**	**Planned Activities During FY 1984**
	o Advanced Receiver and Central Receiver Thermal Subsytems - Concept definition and advanced development of high temperature air heating and large scale entrained particle receiver subsystems, in concert with system studies and conceptual designs for central receiver thermochemical hydrogen production. In addition, solicitation to complete development and prototype testing of advanced design liquid receivers, liquid fired steam generators and technically compatible sensible heat storage subsystems.	- Design, fabricate and test components and subsystems for performance capabilities. Test steam and air application components. And determine feasibility of long-term/ high temperature storage
	o 10 MWe (Barstow) Central Receiver Pilot Plant - Complete one year of experimental operational testing to validate technical feasibility of automated power production from central receiver technology	- Continue operation of the plant to generate electricity into the utility grid. Validate software necessary for automated power production. Examine operating and maintenance characteristics in terms of reliability, economic and potential environmental effects

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Heat Transfer Systems Analysis	- Collect, assess and disseminate data on thermal performance, operation, maintenance and reliability of active solar systems at 20 sites	o Thermal Performance Monitoring - Collect, assess and disseminate data on thermal performance, operation, maintenance and reliability of active solar systems at 44 sites
	o Conduct generic analysis of daylighting impacts	o Daylighting Resource Assessment and Model Measurement - Measure available solar illumination at representative natural locations - Model light measurements and identify controls and assembles required
	o Investigate heat transfer phenomend with emphasis on convection	o Basic Heat Transfer - Examine heat transfer rates in heat pipes under temperature differentials
	o Monitor R&D progress. Evaluate results and strategies	o Planning & Assessment Monitor R&D progress. Evaluate results and strategies

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	**Estimated Activities During FY 1983**	**Planned Activities During FY 1984**
Thermal Science	o Salton Sea - Final design of 5 MW prototype system experiment o Shennandoah Evaluation of operating system in concert with applied research aimed at major cost performance improvements in thermally coupled high temperature distributed receiver test sources o Dish Applied Research - Completion of organic Rankine cycle thermal subsystem development and validation	No FY 1984 funds requested

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	**Estimated Activities During FY 1983**	**Planned Activities During FY 1984**
Technology Development	o Dish Brayton Module - Complete development, fatricate and test dish Brayton module	No FY 1984 funds requested
	o Dish Concentrator Advanced Development - Complete development, fabricate and test advanced concentrator for generic thermal electric and module application	
	o Dish Rankine and Stirling and Parabolic Dish Test Site - Technical monitoring of thermal electric dish industrial contracts and operation of parabolic dish test site in support of Stirling and Rankine module development	
Systems Test and Evaluation	o Second Small Community - DOE funded technical efforts in support of design, development and evaluation of privately purchased parabolic dish thermal electric system for alternate small community site	

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Heat Technologies

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
	o Repowering - DOE cost share of final design phase of one or more on-going repowering project definition efforts	No FY 1984 funds requested

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Photovoltaics

Key Activty	Estimated Activities During FY 1983	Planned Activities During FY 1984
Thin-Film Materials and Cell Research	Research on reaction kinetics and thermodynamics of silane pyrolysis. Research on chemical and physical properties of amorphous thin-film PV materials including deposition dynamic, and physical and electronic properties of interfacing films. Research on single crystal silicon growth mechanisms, chemical impurity clusters, crystal dislocations, defect states, and their effects on semiconductor characteristics.	Advanced R&D on thin-film conversion materials and cells focuses on activities to increase cell efficiencies and stabilities for the most promising current approaches including amorphous silicon, copper-indium-diselenide, cadmium telluride, zinc phosphide, and other binary and ternary compounds semiconductor materials.
High Efficiency Materials and Cell Research	Research on ternary and quaternary compounds for interfacing heterogeneous films in advanced thin-film photovoltaics and on the electronic and semiconductor properties of selected confirgurations. Research on growth theory for multibandgap materials for higher PV cell efficiency and on fluorescing materials for luminescent concentrators. Research in electrochemical materials and reactions and on electronic properties at solid-electrolyte interfaces.	Research on high efficiency materials and cells that can potentially lead to conversion efficiencies in the 30 to 50 percent range and to substantial improvements in module and system performance. Immediate opportunities include advanced concepts based upon gallium arsenide, ternary and quaternary gallium arsenide compounds, multi-layer (cascaded) thin-film and luminescent concentrator materials and cells.
Cell Theory and Validation Studies	Research and defect theory and its application to the development of large areas, high efficiency single bandgap cells. Research on the critical performance elements of advanced concept cells based on multibandgap thin-film structured.	Advances in cell efficiencies, stabilities and lifetime can be substantially accelerated by applying analytical tools for predicting and/or interpreting experimental results. The activities include comparisons and interpretations of analytical and experimental results to validate the analytical model, adjustment

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
	Development of methodologies and test equipment for characteristics of semiconductor materials and devices.	of cell models as required and development of improved measurement techniques.
Analysis, Testing and Reliability Studies	Completion of accelerated life-test models and degradation analysis methods for validation of long-term (20 year) stability in silicon materials and devices. Research and theoretical models for predicting output characteristics of concentrator array subsystems, and identification of research and needs.	Analysis and testing will be performed on failure mechanisms in cells, modules, arrays and systems, and new R&D requirements will be established for long lifetime (20 year +) designs. Accelerated laboratory testing methodology will be refined and implemented and advanced module designs will be verified.

KEY ACTIVITY SUMMARY

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
BIOMASS ENERGY TECHNOLOGY

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
THERMOCHEMICAL CONVERSION	Primary areas of study will be the mechanisms and kinetics of reactions and examination of alternative catalysts at the laboratory scale. Specifically in fast pyrolysis, experimentation will explore pathways to increase the yield of petroleum substitutes such as ethylene, benzene, xylene and toluene. In liquefaction, emphasis will be placed on improving product quality by exploring methods of reducing both the molecular weight and oxygen content of the product oil. Gasification reaction studies will aim at understanding the chemistry of tar and char formation to permit development of alternate approaches to minimize the production of such by-products.	Effort will involve the determination, at the molecular level, of the pathways, thermodynamics, and kinetics of reactions associated with thermochemical conversion processes. Projects will focus on the molecular details of pyrolysis of organic materials for high value gaseous and liquid fuels, examination of single stage conversion of woody organics to methane, and the understanding of direct combustion of biomass based on combustion theory for homogeneous polymers. In addition, work will be performed on oxygen gasification in a high pressure reactor for production of synthesis gas for subsequent liquid fuels synthesis. Work will also be undertaken to develop and field test novel emission control technologies for the removal of noxious pollutants specifically by biomass solid waste combustion.
BIOCHEMICAL CONVERSION	Examine physiology and genetics of microorganisms to expand understanding of methanogens. Examine hydrolysis pretreatment methods for enhanced digestability and methane production. High-rate, high conversion reactors will be explored. Conduct research on phototropic microorganisms capable of producing hydrogen photobiologically. Isolate species of photosynthetic bacteria and blue-green algae. Expand basic understanding of hydrogen metabolism, electron transport and the primary photochemistry of photosynthesis using procaryotic microorganisms.	Biochemical conversion program involves the physiology/biochemistry of microorganisms, the development of microbial processes, anaerobic digestion, and advanced conversion processes. Effort will focus on genetic engineering for microorganisms and genetic manipulation of microorganisms for enhanced fuels production. Nutritional requirements of anaerobic digesters will be studied to improve methane yields and enhance reactor stability. Work will also be conducted on pretreatment to improve digestability of feedstock and on separation and recovery methods for fuel-water mixtures.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
FEEDSTOCK DEVELOPMENT	Exploratory research will be conducted on oil-bearing microalgae. Activity will consist of screening, characterizing and cultivating microalgal species for improved oil production in high saline waters. Innovative approaches involving genetic manipulation techniques will be examined to enhance ability of microalgae to grow in specialized environments and produce greater quantities of high quality oil. Conduct genetic selection and breeding studies of woody crops to improve species identified as having potential for high biomass productivity. Complete field research to identify best species suitable for short rotation intensive culture for each region of the U.S. based on biomass productivity and coppicing ability.	The major problem in microalgal feedstock production are the identification of the most promising species for high sustained yields and the development of optimal management and processing methods suitable for these species. Screening studies of microalgae will be conducted in the laboratory and small-scale field experiments to provide reliable research data on the potential of selected species to provide high sustained yields of high-valued oils.
REGIONAL BIOMASS PROGRAMS	Provide support for wood-derived fuels program at the Bonneville Power Administration (BPA) and Biomass Activities at the Tennessee Valley Authority (TVA). Develop a program to identify and plan for regionally appropriate Biomass technologies.	No additional funding requested.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Wind Energy Systems

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Aerodynamics	Investigate dynamic stall and improved airfoil prediction techniques for vertical axis systems. Investigate the effects of unsteady aerodynamics on blade loads, and advanced air foil configurations, such as tip control, for horizontal axis systems. Continue validation of wake models.	Validate dynamic stall and advanced performance models for vertical axis systems. Investigate 3-dimensional rotor flow and test high-lift-to-drag and variable speed rotors for horizontal axis systems. Develop a single comprehensive wake model for varying terrain and meteorology.
Structural Dynamics	Improve structural dynamics codes and validate fatigue prediction techniques for vertical axis systems. Investigate dynamic coupling between control system, rotor, tower and drive train, and initiate experiments with variable speed generator for horizontal axis systems. Develop theoretical models of wind turbulence spectrum.	Validate advanced structural dynamics models and acquire fatigue data from private machines for vertical axis systems. Test variable speed damping on drive train oscillations and update structural dynamics simulator to include advanced configurations such such as teetered rotors for horizontal axis systems. Develop general models for wind loads and turbulence.
Experimental Machines	Complete repair to Mod-2 cluster and resume research testing. Complete government-funded design phase of Mod-5.	Complete DOE research testing of Mod-2 cluster with prior year funding.
Small Systems Test Center	Initiate fee-paid testing program and continue research.	Continue fee-paid testing and research.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Solar Technology Transfer

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Solar Technical Information	Information planning, service development, data compilation and information transfer	Continue Centralized Technical Information Office which would be responsible for information planning, service development, data compilation and technical information transfer.
Reproduction and Distribution	Report duplication and distribution.	Continue report duplication and distribution.
Mandated Reports	Compile and publish mandated reports.	Continue to compile and publish mandated reports.
Conservation and Renewable Energy Information and Referral Service (CAREIRS)	Provide solar energy information and referral services to concerned individual citizens.	No added funds requested.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary

Solar Program Direction

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Solar Program Direction	Provides for a staff of 88 total Full-Time Equivalent (FTE) positions to perform required technical management and administrative duties	Request a Federal staff of 45 FTE to effectively manage a $84 million (B/A) solar energy research program.

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
VOLUME 2
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FY 1984 CONGRESSIONAL BUDGET REQUEST

MAJOR ACTIVITY OVERVIEW

Geothermal

The goal of the Geothermal Program is to provide alternative means of meeting the nation's energy demands by performing high-risk, high-payoff research which will build a technology base that could be used for future geothermal development by the private sector. The program is structured to remove technical barriers associated with the widespread use of geothermal resources. Applied research and engineering studies have been employed to develop technical knowledge which the private sector can utilize for achieving a domestic geothermal industry.

Prior Year Accomplishments:

- Completed proof of concept experiments for the Hot Dry Rock (HDR) system at Fenton Hill, New Mexico, using a single-fracture thermal loop; completed initial fracturing; and began flow experiments on the Phase II reservoir at the Fenton Hill site.

- Completed short term testing of geopressured resource characteristics for 9 existing industry oil and gas wells in the U.S. Gulf Coast region; and carried out testing of reservoir characteristics for four specifically designed geopressured production wells located in the Texas and Louisiana area.

- Completed negotiations and initiated construction of the 50 MWe Binary Geothermal Demonstration project at Heber, California.

- Finished operational tests of the 5 MWe Raft River Pilot plant. This experiment verified the potential of generating electric energy from moderate-temperature hydrothermal resources.

- Developed high speed geothermal drilling systems, circulation control techniques, and lost circulation zone mapping techniques.

- Completed field test of 500 kWe direct contact heat exchanger pilot plant at East Mesa, California; initiated test of improved heat exchangers and mixtures of working fluids on 60 kWe system; tested downhole brine pumps at East Mesa; and completed evaluation of Helical Screw Expander in Italy and initiated evaluations in New Zealand.

- Developed the design and completed fabrication of CO_2 and pH probes for monitoring brines in hydrothermal power systems.

- Tested seismic and electromagnetic exploration techniques in geothermal environment for injection monitoring, and completed the evaluation of low temperature reservoir engineering procedures and first phase of the Cerro Prieto, Mexico reservoir data analysis program.

- Completed negotiations for the final user-coupled hydrothermal resource definition drilling project.

- Completed test and evaluation of the electron beam process for removal of H_2S from geothermal fluids.

Outyear Objectives:

- Develop a technology base for extracting energy from hot dry rock resources through Phase II flow experiments.

- Develop technologies required for the economic disposal of spent brines by injection into hydrothermal reservoir formations in an environmentally acceptable manner.

- Develop technologies needed to find, delineate, characterize and manage hydrothermal reservoirs.

- Evaluate technology capable of reducing electric generating facilities cost, improving energy conversion efficiencies, and reducing technical risks of fluid handling for moderate temperature hydrothermal reservoirs.

- Develop new technologies for penetrating hard rock.

- Identify magma resources potentially accessible for energy extraction.

Accomplishment of these specific objectives will help meet the provisions of pertinent public laws; assist in the development of significant technologies that the private sector is not able to pursue; and transfer research results to the private sector in order to encourage their investment in the geothermal industry. An extension of industrial interest in moderate temperature hydrothermal reservoirs will also increase the revenues from Federal leases, since more than half the total geothermal resource base is on Federal lands.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

Geothermal
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

Geothermal	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Hydrothermal Industrialization				
Operating Expenses	$ 8,624	$ 2,000	$ 2,000	$ 0
Capital Equipment	$ 0	$ 0	$ 0	$ 0
Construction	$ 22,558 A/	$ 27,020	$ 27,020	$ 0
Subtotal	$ 31,182	$ 29,020	$ 29,020	$ 0
Geopressured Resources				
Operating Expenses	$ 16,686	$ 4,400	$ 4,400	$ 0
Capital Equipment	$ 0	$ 0	$ 0	$ 0
Subtotal	$ 16,686	$ 4,400	$ 4,400	$ 0
Geothermal Technology Development				
Hot Dry Rock Research				
Operating Expenses	$ 9,700	$ 7,500	$ 7,500	$5,040
Capital Equipment	$ 300	$ 0	$ 0	$ 0
Subtotal	$ 10,000	$ 7,500	$ 7,500	$5,040
Hydrothermal Research				
Operating Expenses	$ 9,876	$ 7,208	$ 7,208	$4,434
Capital Equipment	$ 560	$ 250	$ 250	$ 0
Subtotal	$ 10,436	$ 7,458	$ 7,458	$4,434
Hard Rock Penetration Research				
Operating Expenses	$ 0	$ 0	$ 0	$2,640
Capital Equipment	$ 0	$ 0	$ 0	$ 0
Subtotal	$ 0	$ 0	$ 0	$2,640
Magma Energy Extraction Research				
Operating Expenses	$ 0	$ 0	$ 0	$ 845
Capital Equipment	$ 0	$ 0	$ 0	$ 0
Subtotal	$ 0	$ 0	$ 0	$ 845

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

Geothermal
Energy Supply Research and Development - Operating Expenses
Energy supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

Geothermal	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Geothermal Technology Transfer				
Operating Expenses	$ 0	$ 0	$ 0	$ 100
Capital Equipment	$ 0	$ 0	$ 0	$ 0
Subtotal	$ 0	$ 0	$ 0	$ 100
Total Geothermal Technology Development	$ 20,436	$14,958	$14,958	$13,059
Program Direction	$ 1,600	$ 1,250	$ 1,250	$ 494
Grand Total				
Operating Expenses	$ 46,486	$22,358	$22,358	$13,553
Capital Equipment	$ 860	$ 250	$ 250	$ 0
Construction	$ 22,558	$27,020	$27,020	$ 0
Geothermal	$ 69,904 B/	$49,628	$49,628	$13,553
Staffing FTP/Total FTE	21/21	20/21	20/21	8/8

A/ Heber 50 MWe Demonstration appropriation was enhanced by $14 million budget supplemental in FY 1982. This was a reallocation of prior year unobligated Geothermal Resources Development - Loan Guaranty Reserve and Interest Differential Assistance Funds.

B/ Remaining funds after a general reduction of $6,926,000.

Authorization: P.L. 93-410 Geothermal Research, Development and Demonstration Act of 1974

Summary of Changes
Geothermal
(dollars in thousands)

FY 1983 Appropriation enacted	$ 49,628
Built in increases and decreases:	0
FY 1984 base	$ 49,628
Program increases and decreases:	
Hydrothermal Industrialization	
o Complete funding for 50 MWe Heber Binary Demonstration plant construction	-$ 29,020
Geopressured Resource	
o Carryout flow testing of three design wells	-$ 4,400
Geothermal Technology Development	
Hot Dry Rock	
o Proceed with completion and testing of the final loop at the Fenton Hill Hot Dry Rock site	-$ 2,460
Hydrothermal Research	
o Conduct activities in the areas of brine injection, reservoir definition, and heat cycle research	-$ 3,024
Hard Rock Penetration Research	
o Initiate rock mechanics, borehole mapping, melting and vaporization technique development and begin study of polymer materials for drilling fluid loss control	+$ 2,640
Magma Energy Extraction	
o Start the identification of magma reservoir prospects and establish resource viability	+$ 845
Geothermal Technology Transfer	
o Transfer geothermal research and development results to the private sector	+$ 100
Program Direction	
o Reduction of 11 full time equivalent positions	-$ 756
FY 1984 budget request	$ 13,553

FY 1984 Congressional Budget Request
Geothermal Energy Narrative

Geothermal

A total of $13,553,000 is being requested for the FY 1984 Geothermal Energy Program.

No funds are being requested for Hydrothermal Industrialization in FY 1984 since it is anticipated that sufficient funds will be available prior to FY 1984 to cover the 50 MWe Binary Demonstration Project at Heber, California.

Also no further Geopressured Resource activities are being proposed in this FY 1984 program.

Geothermal Technology Development .... $ 13,059,000

The five activities within the Geothermal Technology Development subprogram include hot dry rock research, hydrothermal research, hard rock penetration, magma energy extraction research and geothermal technology transfer.

- Hot Dry Rock Research ($5,040,000)

  Funds under this activity will be used to complete the Phase II thermal loop at Fenton Hill, NM to the originally planned size, and to operate that loop for an extended period to assess reservoir longevity, operating performance and environmental effects. Proof of concept experiments have been conducted with a single-fracture thermal loop at Fenton Hill. An interim multi-fracture loop is under construction. This loop will neither be large enough nor will it have operated long enough to answer significant outstanding questions about Hot Dry Rock (HDR) technical feasibility. These questions deal with critical topics such as: (1) flow control through multiple fractures; (2) thermal drawdown and prediction of reservoir longevity; (3) fracture mapping and modeling of flow; (4) controlling dissolved solids content of circulating fluids; (5) scaling and corrosion; (6) minimizing reservoir impedance; and (7) long term environmental effects. These questions can best be resolved by completion of the loop system now partially constructed at Fenton Hill. The final loop system would fulfill DOE's commitment for long term development under the IEA agreement with West Germany and Japan. If the project were to proceed in 1984 both countries could then justify a continuation of their technical and financial support.

  After a suitable testing period for the interim thermal loop, additional fractures will be created in the Fenton Hill system. The final design loop will have a nominal design capacity of 35 MW. Surface equipment will be modified to accommodate larger flow and heat dissipation requirements. Arrangements will be made for an increased water supply. Support activities such as environmental monitoring, modeling, and instrumentation development research will continue.

o Hydrothermal Research ($4,434,000)

In FY 1984, research will be performed in three major task areas: brine injection technology, reservoir definition, and heat cycle research.

- Brine Injection Technology: The objective of this task is development of technology required for the economic disposal of spent brines in an environmentally acceptable manner by injection into geothermal reservoir formations.

  In the process of generating electric power from liquid-dominated hydrothermal reservoirs, geothermal power plants produce enormous quantities of spent fluids which must be disposed of in an environmentally acceptable manner. Subsurface disposal of spent brines is required according to environmental regulations. The lack of a capability to reliably predict and mitigate potential problems with subsurface disposal of these fluids has been identified by private industry as a serious technological/economic barrier to widespread geothermal development in the U.S.

  Funds requested in FY 1984 will address this problem by performing research activities in the subtasks of fluid migration monitoring and prediction, surface treatment technology, and well completion technology.

  Fluid Migration Monitoring and Prediction - Tracer, geophysical monitoring, and modeling technologies will be developed to monitor and predict the migration of spent brines injected in geothermal reservoirs.

  Surface Treatment Technology - Environmentally acceptable chemical conditioning methods will be developed to prevent unwanted chemical reactions in the well and adjacent injection zone.

  Well Completion Technology - Well completion concepts will be developed which enhance the acceptance of injected brine and extend the useful life of the injection well.

- Reservoir Definition: The objective of this task is to improve the technologies needed to find, delineate, characterize, assess, and manage hydrothermal reservoirs. The FY 1984 request will support reservoir productivity assessment and fracture mapping activities.

  Reservoir Productivity Assessment Technology - Activities will include the development and testing of hydrothermal reservoir prediction models, the measurement of hydrothermal reservoir performance under production conditions and the comparison of this data with model predictions.

  Fracture Mapping Technology - Various surface and subsurface geophysical techniques will be evaluated for their capability to locate, with sufficient accuracy, natural fracture systems within hydrothermal reservoirs that can be successfully targeted for drilling. Preliminary field tests of seismic (downhole noise survey, mapping of nanoearthquakes, and crosshole seismic tomography), electrical (self-potential and resistivity), and magnetotelluric techniques show some promise for this application. The private sector has been reluctant to undertake or support these long term, high risk generic research and development studies.

- Heat Cycle Research: This task includes the study of working fluids and cycles, heat transfer concepts, and downhole pumps. The task goal is the development of the technology required for the economic generation of electricity from hydrothermal resources.

  Working Fluids and Cycles - Basic analyses of fluid compositions, equations of state, critical point conditions, transport properties and binary cycle power systems will be performed.

  The FY 1984 request includes funding to identify and evaluate new binary cycle system designs such as combined cycles (characterized by prior year research); to characterize thermophysical and transport properties of improved working fluids by laboratory measurements; and to develop theoretical models of organic working fluids expansion in turbines of appropriate design.

  Heat Transfer Concepts - New design of heat exchangers, condensers and heat rejection systems for geothermal electric power generation will be evaluated.

  FY 1984 funding will be used to improve thermodynamic and physical design of evaporators; test alternative tube materials, sieve tray designs, working fluid recovery systems; and develop new designs for condensers and heat rejection systems employing new concepts, capable of operating with lower cooling water flows.

  Downhole Pumps- New engineering solutions to improve the service life of downhole pumps will be developed.

  Binary cycle plants need single-phase, unflashed brine for maximum efficiency. Pumps enhance well flowrate and keep fluid pressure at high enough pressures to prevent flashing (vaporizing). Commercially available pumps developed for other purposes have consistently failed in DOE field tests. Longer lifetimes and deeper setting depths are needed specifically for use in the geothermal wellbore environment. Private sector efforts in this area have been limited because too small an immediate market is perceived.

o Hard Rock Penetration Research ($2,640,000)

Specific research tasks to be included in this area are mechanics of rock penetration under downwell conditions; rugged gyros for borehole mapping; drilling instrumentation and data transmission; melting and vaporization experiments; and high temperature polymers for fluid control.

- Mechanics of Rock Penetration Under Downwell Conditions: Work under this task will measure parameters associated with rock penetration by crushing, spalling, shearing, erosion, and shock loading under simulated geothermal downwell conditions; and develop a theoretical or empirical correlation between predicted and measured performance of rock penetration devices. A detailed understanding of penetration mechanics has not yet been developed for downwell conditions; and better understanding of this area will permit the design and development of improved genthermal rock penetration equipment and techniques with higher penetration rates and longer life.

The amount requested in FY 1984 would be used to devise test equipment and perform testing over a selected range of conditions in a geothermal rock mechanics laboratory.

- Rugged Gyros for Borehole Mapping: The objective of this task is to provide a reliable means for mapping boreholes to accuracies of the order of 1 cm., so that intercept drilling can be performed with precision.

  The FY 1984 funding will be used to perform research for a rugged system using a pair of twin-axis gyros based on the "nodding mushroom" type developed for the space program. Because these can have large roller bearing surfaces instead of jewels, they have the potential of not having to be downgraded to operate in the geothermal environment. After laboratory research and development, the prototype will be field tested for reproducibility of results at depth, then made available for use in Hot Dry Rock research and other applications.

- Drilling Instrumentation and Data Transmission: The objectives of this task are (1) to measure values of parameters during drilling operations into hard rock; (2) to correlate the data with penetration rates and drill degradation; and (3) if practicable, to provide closed-loop control over critical top-side drilling parameters.

  The requested budget for FY 1984 will be used to devise instruments such as strain gauges, thermocouples, pressure transducers, and accelerometers capable of measuring critical downwell drilling parameters. The research results will be incorporated into the design of new rock penetration bits for test. Funds will also be used to design conditioning, recording, and transmitting equipment for use with turbodrills and conventional drills, and to test the earlier instruments/equipment in a rock mechanics laboratory.

- Melting and Vaporization Experiment: The objective of this task is to assess the potential use of melting and vaporization techniques as a hard rock drilling method. Rock penetration devices based on oil and gas well drilling are very costly when used for geothermal wells. Material removal methods by cutting, crushing, erosion and other mechanical means are being developed, but a breakthrough is needed in the technology. Melting and vaporization may offer such a breakthrough.

  Plasmajets have been used for cutting reinforced concrete, and diesel fuel has been used with oxygen-enriched air to flame-cut near-surface rock. Adaptation of these techniques to deep drilling requires schemes for removing the rock wool or other debris. Funds being requested in FY 1984 will be used to develop and evaluate design approaches for this technique and to perform preliminary testing.

- High Temperature Polymers for Fluid Loss Control: The objective of the remaining task is to develop an effective material for fluid loss control during drilling at high temperatures that will degrade after it has performed its function.

  The FY 1984 request will be used to fund screening and selection of polymers to be used as additives to bentonite, sepiolite, or other drilling fluids; to conduct laboratory experiments to determine the behavior of selected candidates under a range of downwell conditions; and to field test these polymers in selected wells.

o Magma Energy Extraction ($845,000)

This activity will involve research associated with the identification of reservoir prospects for magma tapping. The goal is to verify the viability of exploiting magma resources. The U.S. Geological Survey has estimated the magnitude of the resource and its general location. There is a need to explore the extent of exploitable magma energy in the U.S. Magma may be one form of geothermal energy that is readily renewed, and it could provide a significant portion of the nation's energy.

The FY 1984 funding requested will be used to identify magma bodies within accessible depths and to establish cost estimates for drilling into the molten rock. Population centers and other potential users of the energy in close proximity to the magma reservoirs will also be identified. The resulting prospects will be ranked and a value determination on pursuing magma energy extraction will be made on an expected-costs basis.

o Geothermal Technology Transfer ($100,000)

A technical information effort similar to the Solar Technology Transfer Program is being proposed for funding in FY 1984. This activity will aim at supporting non-Federal geothermal research and development by transmitting to scientists, engineers, educators and decision makers the results of agency-sponsored geothermal investigations.

Program Direction .... $ 494,000

The staffing level requested to support the Geothermal Energy Program in FY 1984 consists of 10 full time permanent personnel. The personnel requirements include administrative and technical talent who manage a broad range of geothermal and hydropower research and development activities.

Some of the major headquarters personnel responsibilities will include the establishment of broad objectives, scopes of work, general resource allocations and broad technical management interfaces necessary for program direction. Responsibilities will also include the assessment of technical milestone progress, cost expenditures, coordination of all the contractor's activities, and initiation of appropriate actions to resolve problems in any of these areas. Further, responsibilities will include administrative aspects such as budgeting, procurement, long and short range program planning and personnel management activities. In addition, some personnel will be required to interface with a number of other Federal agencies (such as NASA, NBS, and DOI), national laboratories and international bodies in order to implement program activities.

In addition to new activities proposed for FY 1984, much of an estimated $50 million in uncompleted research initiated in prior years will be completed during this same time interval.

Requested personnel staffing was derived from a projected FY 1984 workload level of on-going technical task/projects and required complementing administrative duties.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Geothermal Energy

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
ydrothermal Industrialization	HEBER PROJECT o Obtain approval for Heat Sales Agreement. o Execute contract modification for final phase of work under the Cooperative Agreement. o Award construction for site preparation and civil/structural work. o Commence well field development. o Complete plant design and procurement of equipment.	HEBER PROJECT o Award construction contracts for mechanical and electrical work. Start construction work. o Complete Imperial Industrial District transmission line upgrade. o Commence brine flow.
eopressured Resources	ENGINEERING DEVELOPMENT o Carryout flow testing of three design wells.	ENGINEERING DEVELOPMENT o Plug and abandon design wells and restore sites.
eothermal Technology Development	HOT DRY ROCK RESEARCH o Complete interim thermal loop at Fenton Hill site. o Operate interim thermal loop in accordance with available funds.	HOT DRY ROCK RESEARCH o Complete the Phase II thermal loop at Fenton Hill, N.M. to the originally planned size. o Begin extended operation of loop to assess reservoir longevity, operating performance and environmental effects.
	HYDROTHERMAL RESEARCH Drilling and Well Completion o Complete laboratory percussion tests of rock/cutter interaction. o Complete heat properties study of aqueous foam for lost circulation control. o Complete acoustic performation test for cement bond log.	HYDROTHERMAL RESEARCH Drilling and Well Completion o Covered in part under Hard Rock Penetration Research Task.

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Geothermal Technology Development (con't)	Reservoir Stimulation Technology o Definition of existing reservoir/injection zones to determine nature of permeability enhancement. o Complete final well stimulation experiment.	Reservoir Stimulation Technology o Complete prior year activities.
	Energy Conversion Technology o Continuation of development of binary cycle technology for production of electric power from moderate temperature reservoirs. o Conclude evaluation of direct contact heat exchangers and downhole brine pumps.	Energy Conversion Technology o Covered in part under Heat Cycle Research Task.
	Geochemical Engineering & Materials o Characterization of brines. o Evaluation of fluid handling systems. o Development of geochemical monitoring and control techniques. o Development of cost-effective materials for borehole and energy conversion components. o Materials testing.	Geochemical Engineering & Materials o Covered in part under Brine Injection Technology Task and Hard Rock Penetration Task.
	Geoscience Technology o Development and field testing of geophysical and geochemical techniques designed to increase the exploration success rate. o Development of reservoir engineering techniques capable of estimating reservoir capacity and forecasting reservoir depletion rate.	Geoscience Technology o Covered in part under Reservoir Definition Task and Brine Injection Technology Task.

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Geothermal Technology Development (con't)	Environmental Control Technology o Complete test of direct chlorination H_2S process. o Complete study of induced seismicity.	Environmental Control Technology o Complete prior year activities.
	Brine Injection Technology o Not a separate task until FY 1984.	Brine Injection Technology o Development of tracer, geophysical, and modeling techniques to monitor and predict migration of spent brines injected in reservoirs. o Development of chemical conditioning methods to prevent unwanted chemical reactions in well and adjacent injected zone. o Development of well completion technology to enhance acceptance of injected brine and extend useful life of injection well.
	Reservoir Definition o Not a separate task until FY 1984.	Reservoir Definition o Development and validation of reservoir models capable of predicting productivity and depletion rates. o Evaluation of surface and subsurface geophysical techniques capable of mapping natural fracture systems within reservoirs.

Key Activities	Estimated Activities During FY 1983	Planned Activities During FY 1984
Geothermal Technology Development (con't)	Heat Cycle Research o Not a separate task until FY 1984.	Heat Cycle Research o Evaluation of new binary cycle system designs. o Characterization of properties of hydrocarbon working fluids. o Evaluation of new designs of heat exchangers, condensers, and heat rejection systems. o Development of new engineering solutions to improve service life of downhole brine pumps.
	HARD ROCK PENETRATION RESEARCH Mechanics of Rock Penetration under Downhole Conditions o Not a separate task until FY 1984.	HARD ROCK PENETRATION RESEARCH Mechanics of Rock Penetration under Downhole Conditions o Laboratory measurements of parameters associated with rock penetration under simulated downhole conditions.
	Rugged Gyros for Borehole Mapping o Not a separate task until FY 1984.	Rugged Gyros for Borehole Mapping o Engineering evaluation of capability of rugged gyros for borehole mapping.
	Drilling Instrumentation and Data Transmission o Not a separate task until FY 1984.	Drilling Instrumentation and Data Transmission o Evaluation of existing instruments capable of measuring downhole drilling parameters.

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Geothermal Technology Development (con't)	Melting and Vaporization Experiments o Not a separate task until FY 1984.	Melting and Vaporization Experiments o Complete preliminary conceptual designs for melting and vaporization drilling schemes.
	High Temperature Polymers for Fluid Loss Control o Not a separate task until FY 1984.	High Temperature Polymers for Fluid Loss Control o Selection of candidate polymers to be tested as materials for lost circulation control during drilling.
	MAGMA ENERGY EXTRACTION Resource Definiton o Not a separate task until FY 1984.	MAGMA ENERGY EXTRACTION Resource Definition o Evaluation of characteristics and location of magma bodies within accessible depth. o Estimate the cost of energy extraction from selected prospects.
	TECHNOLOGY TRANSFER o Not a separate task until FY 1984.	TECHNOLOGY TRANSFER o Transmit agency sponsored R&D results to scientist, engineers, educators, and other decision makers.
Program Direction	o Supports a staff of 20 FTE's and 1 OTFTP to manage a broad range of Geothermal R&D activities	o Supports a staff of 10 FTE's to manage a broad range of Geothermal R&D activities.

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW

Hydropower

The goal of the Hydropower Program has been to reestablish a vigorous small hydropower industry in the United States. Presently, the U.S. has 6,200 megawatts (MW) of developed capacity at sites of 30 MW or less. The interest of potential developers in recent years has been overwhelming. Applications to FERC for preliminary permits have been growing dramatically. Applications increased from nearly 0 prior to 1977, to over 70 applications in 1979, over 400 in 1980, and about 1,900 in 1981. Recognizing that rising energy costs would help make smaller hydro plants economically viable without Federal subsidy, the agency began an orderly close-out of the small hydropower program in FY 1981. In FY 1982, three more demonstration projects were completed. Ultra-low head and other small hydro technology research will be completed with FY 1983 funding.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Hydropower
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Hydropower				
Small-scale hydropower development				
Operating expenses.......	$ 2,750	$ 750	$ 750	$ 0
Capital equipment........	$ 0	$ 0	$ 0	$ 0
Subtotal...........	$ 2,750	$ 750	$ 750	$ 0
Feasibility studies loan program				
Operating expenses.......	$ 0	$ 0	$ 0	$ 0
Capital equipment........	$ 0	$ 0	$ 0	$ 0
Subtotal...........	$ 0	$ 0	$ 0	$ 0
Program Direction				
Operating expenses.......	$ 250	$ 250	$ 250	$ 0
Subtotal.............	$ 250	$ 250	$ 250	$ 0
Total				
Operating expenses.......	$ 3,000	$ 1,000	$ 1,000	$ 0
Capital equipment........	$ 0	$ 0	$ 0	$ 0
Hydropower...........	$ 3,000	$ 1,000	$ 1,000	$ 0
Staffing................. ..	4/4	4/4	4/4	2/2

Authorization: Sec. 4 P.L. 93-577; Title IV, P.L. 95-617; P.L. 96-294
P.L. 93-577 - Non-Nuclear Energy Research & Development Act of 1974
P.L. 95-617 - Public Utilities Regulatory Policies Act of 1978
P.L. 96-294 - Energy Security Act of 1980

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES

Hydropower
(In thousands of dollars)

FY 1983 Appropriation enacted	$1,000
Built in Increases and Decreases:	0
FY 1984 Base	$1,000
Small Scale Hydropower Development	
o Termination of ultra-low head and other small hydro technology development activities	-$ 750
Program Direction	
o Elimination of 4 full-time equivalent positions	-$ 250
FY 1984 Budget Request	$ 0

Hydropower

No funds have been recommended by the Department to support this program in FY 1984. A phase-out is currently in progress of prior year funded R&D, demonstration and feasibility study loan activities.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Hydropower

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Technology Support	o Continue to provide technical monitoring and support for previously funded DOE loans, demos, and R&D projects. o Analysis and dissemination of "lessons learned" under previously funded DOE/EPRI cooperative agreement.	o Continue to monitor and support prior year activities. o Complete DOE/EPRI technology transfer project.
Environmental R&D	o Complete field research on minimum streamflow requirements.	o Complete analysis and final report of previously funded minimum streamflow R&D.
Engineering R&D	o Complete previously funded projects: - Marine thruster - Schneider engine - Prefabricated systems design (with EPRI) - Micro-Hydro Handbook - Pumps-As-Turbines Profile o Also perform research leading to field tests on one ultra low-head concept : variable-speed generator.	o Complete DOE participation in previously funded projects, all with EPRI.
Program Direction	o Four FTE's would be provided to support ongoing program activities.	o Staff support would be provided from the Geothermal Program.

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
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Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST

Electric Energy Systems (EES) and Energy Storage

EES and Storage support a wide range of generic research activities that have applications for electric utilities and electric vehicles. In addition, these programs assist the Solar programs in focusing attention on the needs and requirements of the electric utility sector and in supplying technology options on which the private sector can build in these areas. Past research has included work on thermal storage materials to save energy in buildings and electrolytic techniques that improve the efficiencies of industrial processes. Storage, in particular, has application to the solar program by carrying out research on storing solar-generated electricity; EES also supports the solar program by guiding their work so that the dispersed power sources can be readily integrated into existing electrical power generating systems.

The goals of these long-term research programs are to assist the private sector by:

- Conducting R&D on technology options that will improve operation of the Nation's electric energy system under all system conditions, including national emergencies.
- Increasing the opportunity for industry to substitute coal, nuclear, and renewables for petroleum and natural gas and to increase the use of renewable but intermittent energy sources.
- Determining the health effects and risk to humans, plants and animals exposed to high voltage electric fields.
- Increasing energy productivity by providing the technology base for industry to use in improving the efficiencies of electrolytic processes and by recovering waste heat from many processes commonly in use today.
- Decreasing the need for new peaking electric equipment by providing the technology base for load-leveling energy storage and better electrical management techniques through an improved generating system.

In FY 1983 important accomplishments for EES included:

- Completed cool-down on superconducting cable cryostat and completed preliminary full power tests on the fully fabricated cable system.
- Completed initial animal biological studies to determine effects of exposure to high-voltage electric gradients.
- Completed preliminary assessment of the impact of electromagnetic pulse (EMP) on the Nation's electric transmission and distribution systems.
- Developed final research options for deepwater submarine cable project connecting the Hawaiian Islands.
- Completed new techniques for faster computation of system load flows and detection of system emergency conditions.
- Completed the baseline battery energy storage test facility (BEST) and prepared facility for advanced battery prototype tests.
- Completed design and procurement of all major elements in the distribution automation and control project at Athens/TVA system.

FY 1983 Storage accomplishments included the following:

- Completed fabrication and performance testing of an advanced 1.3 kWh zinc-bromine module with microprocessor control and automatic shunt protection.
- Completed bench-scale testing of a 30 kWh sodium-sulfur battery for electric vehicles.
- Completed fabrication and initiation of testing of bifunctional air electrodes for metal-air batteries.

Longer term objectives for the next year for EES will stress cutting-edge research in the area of mathematical models development and analyses to assist the utility sector in achieving greater efficiencies; carrying out further research in the newly emerging area of understanding and counter-acting the effects of large electromagnetic pulses; and providing independent research data on the effects of electric fields on mammals. Energy Storage research goals in the same timeframe will stress investigating and solving the problems of electrochemical corrosion; improving the efficiency and lifetime of flow batteries; carrying out further testing of all battery systems; and transferring these electrochemical technologies to the private sector at the earliest opportunity.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Electric Energy Systems and Energy Storage
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Electric Energy Systems				
Systems Architecture and Integration				
Operating Expenses........	$ 6,100	$	$	$
Capital Equipment.........	0			
Subtotal................	6,100	0	0	0
Power Delivery				
Operating Expenses........	11,825			
Capital Equipment.........	400			
Subtotal................	12,225	0	0	0
Generation and Storage Analysis				
Operating Expenses........	2,100			
Capital Equipment.........	0			
Subtotal................	2,100	0	0	0
Electric Fields Effects				
Operating Expenses........		2,600	2,600	2,000
Capital Equipment.........		0	0	0
Subtotal................	0	2,600	2,600	2,000
Power Delivery (Reliability R&D)				
Operating Expenses........		3,900	3,900	4,000
Capital Equipment.........		0	0	0
Subtotal................	0	3,900	3,900	4,000
Systems Technology				
Operating Expenses........		10,200	10,200	6,600
Capital Equipment.........		0	0	0
Subtotal................	0	10,200	10,200	6,600
Program Direction				
Operating Expenses........	875	500	500	102
Subtotal................	875	500	500	102
Total-Electric Energy Systems				
Operating Expenses........	20,900	17,200	17,200	12,702
Capital Equipment.........	400	0	0	0
	21,300	17,200	17,200	12,702
Energy Storage				
Electrochemical Energy Storage				
Operating Expenses........	24,650	18,000	18,000	13,900
Capital Equipment.........	900	0	0	100
Subtotal................	25,550	18,000	18,000	14,000
Physical and Chemical Energy Storage				
Operating Expenses........	12,050	7,000	7,000	0
Capital Equipment.........	400	0	0	0
Subtotal................	12,450	7,000	7,000	0
Program Direction				
Operating Expenses........	500	700	700	200
Subtotal................	500	700	700	200
Total-Energy Storage				
Operating Expenses........	37,200	25,700	25,700	14,100
Capital Expenses..........	1,300	0	0	100
	38,500	25,700	25,700	14,200

TOTAL-Electric Energy Systems and Energy Storage				
Operating Expenses..........	58,100	42,900	42,900	26,802
Capital Equipment...........	1,700	0	0	100
	59,800	42,900	42,900	26,902
Staffing				
FTP/Total FTEs	27/27	0	0	6/6

Authorization: P.L. 93-577, The Federal Nonnuclear Energy Research and Development Act of 1974.
P.L. 94-413, The Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976.
P.L. 95-91, The Department of Energy Organization Act.
P.L. 95-590, Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978.

SUMMARY OF CHANGES

ELECTRIC ENERGY SYSTEMS

FY 1983 appropriation enacted...	$17,200
Program increases and decreases:	
Reduce level of research effort in electric field effects..................	- 600
Increase basic research in dielectric materials............................	+ 400
Increase research in electromagnetic pulse (EMP) effects...................	+ 600
Complete research in ac/dc power conversion technologies...................	- 300
Phase out research on system stability, emergency detection and control, adaptive protection concepts, and uncertainty modeling................	- 900
Increase research in superconducting cable transmission....................	+ 600
Phase out synthetic insulation research for ambient temperature cables.....	- 400
Stretch out development program for deep water submarine cable technology..	- 3,800
Increase research in ion effects from high voltage direct current (HVDC) transmission lines...	+ 1,000
Increase research in performance, interruption mechanisms, and analysis of HVDC transmission integrated with AC systems..........................	+ 2,600
Terminate basic research in low-loss magnetic materials, insulation materials, and surge-arrester materials...................................	- 1,100
Phase out superconducting generator research project.......................	- 1,000
Phase out advanced prototype battery testing for utility load leveling applications..	- 400
Complete initial program in the design, protection, control and communication in distributed systems with dispersed renewable sources..........	- 800
Reduce program direction allowance to 2 FTE................................	- 398
FY 1984 Budget Request..	$12,702

ENERGY STORAGE

FY 1983 appropriation enacted	$25,700
Program increases and decreases:	
Reduce supporting research for technology base	- 800
Decrease effort on advanced air cathodes	- 100
Decrease materials research efforts	- 200
Reduce work on fuel cell processes	- 600
Decrease development on sodium-sulfur batteries	- 200
Reduce development effort on zinc-bromine batteries	- 900
Terminate work on lead-acid batteries	- 150
Phase out efforts on lithium-metal sulfide batteries	- 250
Reduce testing activities at National Battery Test Laboratory	- 900
Add funds for capital equipment	+ 100
Terminate activities in physical and chemical storage	- 7,000
Reduce program direction allowance to 4 FTE	- 500
FY 1984 Budget Request	$14,200

Department of Energy
FY 1984 Congressional Budget Request
Narrative Justification
Electric Energy Systems

The Electric Energy Systems element of Energy Systems Research deals with generic, long range research for future electrical transmission, distribution and storage. It includes electric field effects, high voltage technology, underground transmission, communications and operations, system coordination and control, and electrical storage technology research. Inherent in this research are specific subelements in the biological and behavioral sciences, high voltage (alternating and direct current) transient and steady state technology, large scale system theory, high frequency data and control networks, and load flow and load leveling experience.

Funding of $12,702,000 is requested for project areas as follows:

Electric Field Effects..	$2,000,000

This research will examine the effects of exposure to high voltage lines on biological elements, from cells to whole animals. This will be accomplished through a series of biological studies on animals, cells and tissues. The scientific results of cellular and whole animal studies will be reviewed and assessed to identify their implications for human health effects.

Power Delivery..	$4,000,000

Research will continue in both direct and alternating (ac and dc) current systems to provide options for improved network stability and inter-regional energy displacement which are more economical and highly reliable. Under civil, military or weather initiated disruptions, a strong electric network capable of quick restoration is essential to maintain economic and industrial security. During normal operating conditions system efficiency and reliability are important to a strong economy. These issues will be met through research to examine the mechanism by which insulation systems breakdown under transient conditions and aging; in developing new solid and gaseous insulation materials; in assessing the use of fiber optics as a means to directly sense electrical and physical phenomena; and to develop an understanding of the impact of electromagnetic pulses (EMP) on power systems, including how this transient effect couples into transmission and distribution circuits.

System Technologies..	$6,600,000

This program is conducting R&D on new control and protection concepts for both the distribution and the high voltage transmission circuits, and in developing options for future transfer of large blocks of electric energy other than via overhead lines. This is being accomplished through projects in distribution automation and control, large scale complex system theory, emergency and steady state operation, and advanced communication, control and protection concepts. R&D on both superconducting and ambient very high capacity cables, on direct current deep water submarine cables, on the interaction between ac and dc networks when interconnected, and on the impact of dc ions on the surrounding environment will be conducted.

Program Direction..	$102,000

This provides for 2 FTE's to carry out the planning, management and execution of the Electric Energy Systems program.

Department of Energy
FY 1984 Congressional Budget Request
Narrative Justification
Energy Storage

The Energy Storage Program focuses on research, exploratory development and experimental testing of electrochemical storage and conversion technologies. The program is directed toward conducting long-term, high-risk, potentially high-payoff research efforts designed to provide significantly improved technology for electric vehicles (EV's) and stationary storage applications, such as utility load management and in photovoltaic and wind energy systems. The optimum battery requirements for cycle life, energy and power density, and other performance characteristics are different for each application area. The goal is to provide new knowledge in electrochemical technology that will stimulate further development by the private sector.

Greatly improved technology is needed before electric vehicles will find wide acceptance in the marketplace, with special emphasis on the need for improved batteries. For electric vehicles, the batteries should deliver energy of 70 watt-hours per kilogram, power of 150 watts per kilogram and should have a life of 800 cycles. Research and development will continue on advanced batteries such as sodium-sulfur, zinc-bromine, and aluminum-air systems. Two of these, the sodium-sulfur battery (potential energy density of 140 watt-hours per kilogram) and the zinc-bromine battery (potential of 85 watt-hours per kilogram), also have applications for electric utilities and solar installations by use of alternative battery module designs. In these latter applications, a battery system with a life of at least ten years is desirable. The above energy and power densities and cycle lives represent substantial improvement over currently available commercial batteries and fuel cells.

Accomplishments in the Energy Storage program in FY 1982 and those expected in FY 1983 include:

- Achieved a 20% improvement in specific energy (42 watt-hours per kilogram) and a 250% improvement in cycle life (to 600 cycles) for lead-acid battery technology at the cell and module level.
- Delivered a 20-kilowatt-hour zinc-bromine battery (cost shared with Exxon) for dynamometer evaluation.
- Showed technical feasibility of mechanically refueling a full-scale aluminum-air bicell.
- Completed bench testing of a 30 kilowatt-hour sodium-sulfur battery for electric vehicle application.
- Determined fundamental thermodynamic data for assessing alkaline battery efficiencies.
- Developed an iron-air battery with bifunctional air electrodes, that will have a life of 800 cycles.
- Showed that the addition of manganese to aluminum reduces corrosion and thus increases the electrode life of the aluminum-air battery.
- Achieved an 85% improvement in nickel-iron battery module cycle life (to 700 cycles).
- Transferred air-cathode technology for improved chlor-alkali cell efficiency to the private sector.

- Conducted life cycle testing of full-scale, van-sized, nickel-iron batteries at the National Battery Test Laboratory for potential use by a major auto manufacturer.

Technology Base Research.. $6,900,000

FY 1984 funding provides for research on electrochemical phenomena and processes, materials for batteries and fuel cells, and basic chemical engineering phenomena. Research will include investigations of electrode processes, anodic surface layers, cell thermodynamics and electrochemical kinetics. Research and testing on electrochemical production of hydrogen will be carried out. Electrolyte research will focus on solid polymeric, glass and ceramic electrolytes for fuel cells and batteries, super acids for fuel cells and organic solvents for lithium batteries. Research on materials will include work on current collectors, such as electronically conducting polymers; corrosion-resistant, light weight, low cost structural materials for battery construction; and insulation materials for high temperature batteries. Research on air electrodes for metal-air batteries and fuel cells will aim to increase efficiency, extend life and decrease costs. Research will also be conducted on electrochemical catalysts which do not make use of platinum or other noble metals and on improved carbon substrates.

Exploratory Development and Testing $7,100,000

Exploratory development and testing will continue in the areas of flow batteries, aqueous non-flow batteries and nonaqueous batteries with the aim of providing reliable high performance, safe and environmentally acceptable electrochemical storage systems and technology. Emphasis will be placed on zinc-bromine and sodium-sulfur batteries which show promise of meeting the requirements for stationary and vehicular applications. A 20 kilowatt-hour zinc-bromine flow battery will be fabricated to establish performance characteristics of the system. Research will concentrate on developing a state-of-charge monitor and on improving performance and life. A 30-35 kilowatt-hour, sodium-sulfur battery for vehicular applications will be fabricated and tested in the laboratory. Research will concentrate on problems of container corrosion, improved methods for fabrication of beta-alumina ceramics and techniques for improving the mechanical properties of the beta-alumina electrolyte. The National Battery Test Laboratory (NBTL) will be maintained as a means of testing battery modules and subsystems under controlled conditions to establish operating characteristics of electrochemical systems.

Program Direction $200,000

FY 1984 program direction funds provide for four (4) FTE's.

Capital Equipment $100,000

KEY ACTIVITY TABLE
Electric Energy Systems
(Dollars in Thousands)

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
A. Electric Field Effects		
--Biological Research	o Continue biological studies on animals and cells exposed to high voltage electric gradients.	o Continue biological studies on effects of high voltage gradients on animals, cells, plants, and humans.
--Human Health Assessment	o Continue to assess human health effects from exposure to high voltage gradients, developing a methodology of evaluating the effects.	o Continue assessment analysis for humans exposed to high voltage electric fields looking at the mechanisms interacting in a living body which are affected by the electric gradients.
B. Power Delivery		
--Dielectric Materials	o Continue analysis of transient breakdown and aging of solid dielectric materials.	o Complete investigation on the transient breakdown and aging of solid dielectric materials.
	o Continue development of gaseous dielectric materials and their impact on equipment design. Initiate research in fiber optics for power system use.	o Continue research in - solid dielectric materials - gaseous materials - knowledge of breakdown mechanisms - fiber optics for power system use.
--Electromagnetic Pulse (EMP)	o Continue analysis of EMP effects on interconnected electrical equipment and systems.	o Continue systems assessment of impact of EMP on transmission and distribution circuits. Begin to explore concepts and materials for system protection against EMP surges.

KEY ACTIVITY TABLE
Electric Energy Systems
(Dollars in Thousands)

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
C. Systems Technology		
--Superconducting Cable	o Continue full power tests and verify measurement techniques.	o Complete full power tests, measurements, and assessment of results.
	o Continue ambient temperature cable with synthetic insulation materials developed under the superconducting cable research.	o Initiate impulse tests and evaluate system performance during transient operating conditions.
--High Voltage Direct Current (HVDC) Submarine Cable	o Initiate design and verification of Hawaiian deep water cable. Complete prototype cable lab tests, and develop in-situ repair splice. Design cable deployment and retrieval concepts.	o Complete design verification of deep water submarine cable.
--High Voltage Direct Current (HVDC) Ion Analysis	o Complete data analysis on preliminary work and plan for follow-on research.	o Initiate laboratory and field analysis of d.c. ion propogation and its effects resulting from high voltage direct current transmission.
--DC/AC Systems	o Summarize initial work on control and operation of multiterminal DC systems.	o Initiate analysis and develop concepts to cope with unique characteristics of both the dc and ac systems with a HVDC overlay, including protection, dynamic

KEY ACTIVITY TABLE
Electric Energy Systems
(Dollars in Thousands)

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
C. Systems Technology (Cont.)	o Continue to develop instrumentation tools to aid in the analysis of the interaction of dc and ac systems.	control and reliability. Initiate analysis and develop concepts for new, more effective means of arc extinguishing for use in HVDC circuit breakers. Continue to develop instrumentation and analytical tools to solve complex large scale systems problems.

KEY ACTIVITY TABLE
Energy Storage Technology
(Dollars in Thousands)

Electrochemical Energy Storage

KEY ACTIVITY	FY 1983	FY 1984
o Technology Base for Electrochemical Storage Systems		
--Supporting Research	o Develop technology base for secondary batteries and other electrochemical energy conversion devices; activities include study of electrode processes, materials modeling of electrochemical reactions in battery assessment studies.	o Investigate electrode processes, anodic surface layers, cell thermodynamics, electrochemical kinetics, advanced electrodes, and current collectors.
	o Carry out materials research on compatability of solid electrolytes with electrodes, degradation of solid electrolytes during charge transfer, identification of new electrochemical components and materials.	o Perform research on electrolyte materials, membranes, insulation for high-temperature batteries, new corrosion resistant materials, and low cost, light-weight support structures for use in batteries.
--Electrochemical Systems	o Continue R&D on aluminum/air and iron/air system: develop a mechanically rechargeable 8-cell module; develop advanced anode and cathode; improve system efficiency.	o Further develop air cathode and anode optimization for greater energy efficiency including expanded research for electrochemical catalysts without platinum; conduct re-

KEY ACTIVITY	FY 1983	FY 1984
o Technology Base for Electrochemical Storage Systems --Electrochemical Systems cont.	Develop and evaluate low-cost, long-life air electrode. Continue work on ambient temperature lithium cells and other low-temperature nonaqueous systems including all solid state systems.	search on carbon substrates for electrodes.
	o Conduct applied research on fuel cell electrodes, electrolytes and processes; design, fabricate and test single cells to evaluate research results on a laboratory scale.	o Further fuel cell development, especially on electrolytes and on cell design.
o Exploratory Technology Development --Nonaqueous Systems	o Sodium/Sulfur: Develop new 30 kWh cell configuration to obtain high power for EV's; continue evaluation of 100 kWh modules for utility applications. Studies include fabrication techniques, failure analysis, quality control, and long-term testing. Complete effort on lithium metal-sulfide batteries.	o Continue exploratory development and testing of 100 kWh sodium/sulfur modules and perform research on both electrolytes and components. Conduct research on strengthening of beta alumina to increase life and thermal management systems.

KEY ACTIVITY	FY 1983	FY 1984
o Exploratory Technology Development --Flow Systems	o For load-leveling, solar and EV's: zinc cells and modules with bromine, chlorine, and ferricyanide will be developed and evaluated. Trade offs on energy density, power, efficiency, safety, life, and user simplicity to be examined. Complete work on lead-acid batteries.	o Fabricate and begin testing on small zinc/bromine modules for use in electric vehicles, load leveling, and solar applications. Research on zinc slurry electrodes using polymeric spheres.
o Testing	o Continue development of test systems and testing of nonaqueous, flow/aqueous cells and batteries at the NBTL. Included are batteries for PV and wind energy, EV's, and 100 kWh load-leveling. Increase efforts on post-test analysis. Conduct tests on thermal jackets, battery cases and other components. Conduct requirements analysis and planning.	o Continue statistical cell and battery testing to obtain data on performance of batteries under different regimes over the life of the battery. o Conduct capacity and life tests of new electrolyte for zinc electrodes.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

NUCLEAR

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FY 1984 CONGRESSIONAL SUBMISSION

PROGRAM OVERVIEW

NUCLEAR POLICY

On October 8, 1981, the President announced a new national policy to revitalize the nuclear option. The main elements of this policy are to:

1) Encourage a revitalization of U.S. industry's efforts to develop nuclear power by improving the regulatory and licensing process, properly balancing health and safety concerns.

2) Develop and demonstrate breeder reactor technology.

3) Stabilize government policy concerning reprocessing of light water spent fuel and eliminate regulatory impediments to commercial interest in the technology.

4) Proceed expeditiously to ensure the safe disposal of high-level waste.

In announcing this new policy, the Administration recognized energy supply generally, and nuclear power in particular, is essential to a healthy economy. But energy policy is only one element of the Administration's Economic Recovery Plan. The strategy of the Department in implementing the new nuclear power policy is therefore consistent with, and guided by, the overall Administration strategy for economic recovery. It is an integral part of this strategy.

Continued economic growth and stability is fundamental to our national interest and will require adequate quantities of energy from many sources to be achieved and sustained. Recent improvements in energy efficiency, due to conservation and improvements in technology, imply energy growth at a lower rate than has historically been experienced. While the historical relationship between economic growth (GNP) and energy consumption has been altered by changes in energy usage patterns, electricity growth continues to be closely tied to economic development. The United States, like other industrialized countries, is becoming an electrified economy. For example, even during the energy scarce decade of the 1970's the demand for electricity increased by 50 percent while total end-use consumption of other direct forms of energy increased less than 20 percent.

Electric energy accounts for over 30 percent of total primary energy consumed. By the end of the century, many forecasts predict that electric supply will account for between 40 and 50 percent of the total energy consumed. Thus, much of the future growth in energy supply will have to be met by increased production of electricity. Geothermal, solar electric, low-head hydro and windmills can supply electricity for unique, small-scale applications. Because of economies of scale and the diffuse nature of renewable energy sources, large central station plants will be needed to meet the bulk of new capacity additions. Only coal and uranium offer the potential for economic generation of adequate supplies in the future. Nuclear currently supplies 11 percent of our domestic electrical requirements; with plants being constructed now, nuclear's contribution will grow to about 19 percent by 1985 and to about 22 percent by 1995.

National electric growth rates have decreased from historic high levels in the 1960's and early 1970's and improvements in energy efficiency have affected all sectors of the economy, residential and commercial, industrial, and transportation. However, even the low growth rates experienced in the recent past--2.7 percent per year from 1972 to 1981--imply a doubling of the nation's electrical generation capacity over the next 30 years. Upcoming plant retirements (25 percent of existing steam electric capacity is 20 years old or more) increase the need even more.

The economies of electricity from deployment of current-generation light water reactor (LWR) plants will ultimately be impacted by the availability of economically recoverable uranium ore. Recognizing this fact and in conjunction with current and future technological advances we can create an essentially inexhaustible supply of energy from uranium by developing the next generation of reactors, breeder reactors. These breeder reactors can extend the use of recoverable energy from uranium ore by about a factor of from 60-100 over LWRs. Existing stockpiles of depleted uranium in the form of enrichment plant tails is adequate to fuel breeders for over 700 years.

STRATEGY

The strategy for the nuclear power program contains a number of new approaches and departures from past practices and policies. Specifically:

Federal expenditures will be brought down. Economies are necessary in this as in other programs. Reorientation and consolidation of the Federally-supported nuclear power RD&D program is essential to accomplish these economies and at the same time to assure that the vital national goals in this field are met.

Long-term R&D in high payoff areas will continue to be supported. Federal expenditures in areas more appropriately the responsibility of the private sector will no longer be sustained. Also, in the areas where the Department provides a service such as the disposal of nuclear wastes, procedures will be implemented to recover these costs.

Private sector involvement in meeting the nation's nuclear power goals will receive new emphasis. The Administration recognizes that the Federal regulatory process itself is a major impediment and is taking appropriate action to correct this road block.

GOALS AND OBJECTIVES

Our priority goal must be to stabilize nuclear policy for periods of time commensurate with the long leadtimes characteristic of nuclear technology. The United States Government role should be to create and sustain development of a policy environment in which long term objectives beneficial to the Nation can be achieved primarily by the private sector.

The four fundamental elements of a nuclear strategy to implement the President's policy and achieve the full potential of fission energy's contribution to electrical energy supply are:

1. To promote solutions to institutional and regulatory problems constraining the deployment of commercial nuclear power reactors;

2. To demonstrate breeder reactor technology on an intermediate scale by completion and operation of the Clinch River breeder reactor, to encourage private sector involvement in the Large Scale Prototype LMFBR plant, to focus the R&D program to reduce cost, and to accomplish the R&D vital to the future of any commercial interest in the breeder including the development of a safe, fully operable backend of the fuel cycle.

3. To demonstrate closure of the breeder fuel cycle using test and development facilities to reprocess and refabricate breeder fuel; and

4. To proceed deliberately and swiftly to fulfill the Federal Government's responsibility to safely dispose of high level wastes.

HIGHLIGHTS

The highlights of the Nuclear programs are summarized below:

FY 1983 EXPECTED ACCOMPLISHMENTS

CONVERTER REACTOR SYSTEMS

Light water reactor (LWR) systems

The LWR systems program has historically focussed on three areas; developing safety technology for implementation by the commercial sector, developing and demonstrating technology which can be used by utilities to improve the utilization of uranium in LWRs and reducing occupational radiation exposures while improving nuclear plant productivity.

In recognition of the needs in the LWR industry, a study has been completed that identifies the objectives and content of a modified LWR safety R&D program. Input was obtained from a wide segment of the industry, the Nuclear Regulatory Commission, and the National Laboratories. In conducting the study, an assessment was made of the major causes of problems that are affecting the viability of the LWR industry. This assessment, which included the review of a number of industry studies, generally concluded that the most pressing problems were institutional in nature and not technical. Thus, if technical activities are to be effective, they must contribute to resolution of the institutional problems.

The priorities and expected accomplishments for the program in FY 1983 will therefore be as follows:

1. Highest priority will be support of the Department's legislative initiative on Nuclear Regulatory Reform.

2. The highest priority safety item will be activities to support the Department's Nuclear Regulatory Reform proposals; these include cooperative programs at operating powerplants to improve the utilities capability to maintain the normal operating envelope and respond to off-normal events. Specifically, the program definition phase will be completed and reports from the working groups issued. Review and coordination of NRC, DOE, and industrial safety R&D efforts will be continued consistent with Public Law 96-567.

3. The program will continue to develop of a single advanced extended burnup fuel design. A large-scale test of an advanced fuel design incorporating a high purity zirconium liner on the inside surface of the cladding will be conducted in the Quad Cities BWR plant of Commonwealth Edison. Three irradiations to extended burnup of fuel of current design in power reactors will also be completed during FY 1983.

4. Dose Reduction activities will be restricted to completion of existing contracts.

High temperature reactors

No funding is being requested for the High Temperature Gas-Cooled Reactor program. The focus of this program in FY 1983 will be to complete ongoing technology and conceptual design tasks for the steam cycle/cogeneration configuration of the Lead Plant design. Application and related design and technology studies of advanced and higher temperature modular reactor systems will also be continued.

Three mile island (TMI) activities

The TMI activities program has two major program elements; they are: (1) TMI data acquisition and (2) TMI waste immobilization and reactor evaluation.

TMI Data Acquisition Program

All phases of the TMI data acquisition program element initiated in FY 1980 will continue. Instrumentation and electrical components will be removed from the containment building during manned entries and analyzed off-site to ascertain their condition and cause of failure. Samples of solids, liquids, and gases will be obtained during cleanup activities to determine the extent of radionuclide dispersal within the containment building. A program will be developed for off-site examinations of the damaged TMI core that DOE currently is negotiating to acquire for research and development purposes from the owners.

TMI waste immobilization and reactor evaluation program

This was a new initiative in FY 1982 and has two major elements: (1) a program to conduct R&D on immobilization of abnormal reactor waste products and (2) a program to examine the TMI-2 reactor and core components to acquire important generic safety data.

The Waste Immobilization program will conduct R&D on immobilization of abnormal reactor waste products and will initially focus on demonstrating the feasibility of vitrifying zeolite ion exchange materials from filters used to clean up water in the reactor containment building. The full-scale vitrification demonstration of zeolite ion exchange materials containing waste from the waste containment building and reactor coolant system will be completed in FY 1983. In addition, an immobilization R&D program will be initiated on the EPICOR-II liners containing waste filtered from water in the reactor auxiliary building.

The Reactor evaluation program includes development activities associated with the examination, removal and disposition of the reactor core and internals. These activities also include the development of special systems, equipment, facilities and processes needed to accomplish the defueling operation effectively and expeditiously. Through-the-head visual examination of accessible parts of the reactor upper internals and core were accomplished in FY 1982 and in FY 1983 the reactor head will be removed and the development associated with plenum removal and defueling will be intensified.

Advanced reactor systems

Funding for on-going activities of this program, the investigation of reduced enrichment uranium fuels enrichment for research and test reactors, is not being requested by the Agency in FY 1984, however, the Arms Control and Disarmament Agency is planning to request funding to support these activities in FY 1984.

BREEDER REACTOR SYSTEMS

Development of the Liquid metal fast breeder reactor (LMFBR) remains a high priority in Agency planning because of its ultimate importance as an essentially inexhaustible source of energy. During 1982, the Agency continued its active program of the LMFBR development. The program is structured around plant projects including operation of the Fast Flux Test Facility reactor; final design, construction, and operation of the Clinch River Breeder Reactor Plant (CRBRP); conceptual design of a large breeder; and an advanced concept program to develop breeder technology and support these projects.

These activities will continue in FY 1983. To conform to the plans for FY 1983 and beyond, some activities will be brought to an orderly conclusion and the process of consolidation of other activities will begin. Also, the cooperative efforts with the private sector on the Large Scale Prototype LMFBR plant will be focussed on developing the information on which a decision can be made in the mid 1980's on whether the private sector will proceed with detailed design, construction, and operation of a large LMFBR. This effort will emphasize the achievement of maximum reduction in project costs and technical risks through the use of advanced technical concepts and expanded foreign cooperation.

Principal FY 1983 planned accomplishments are as follows:

- Approach design completion for the CRBRP, continue fabrication of major equipment, conduct site preparation activities as authorized by NRC's order of August 17, 1982, and continue support of NRC's safety and environmental review of the project.
- Implement working arrangements with private industry and foreign governments to establish the conceptual design, cost and schedule of a large scale prototype breeder which reflects the requirements of the utility industry and to the degree feasible the design requirements of participating foreign countries; and develop institutional and financial plans for the research and development, detailed design, construction, and operation of this large breeder.
- Continue the LMFBR breeder base technology program toward the point where the private sector is able to support construction and operation of LMFBR reactor plants.
- Conduct LWBR core end-of-life testing and begin defueling operation of the Shippingport Atomic Power Station. Plant shutdown began in FY 1982.
- Consistent with the Conference Report accompanying the FY 1983 Joint Resolution that became Public Law 97-377, the utility industry has established a task force that includes representatives from the utility industry and Government, to explore proposals that could lead to greater industry cost-sharing in the CRBRP project.

ADVANCED NUCLEAR SYSTEMS

Space and special applications

The Space and special applications program is responsible for the development and delivery of nuclear power sources for U.S. military and civilian space and special missions and for the nuclear health and safety aspects of the program. In FY 1984 the major activity will continue to be the development of the isotope power sources for the NASA Galileo spacecraft planned to be launched in 1986 and the NASA/ESA (European Space Agency) spacecraft also planned to be launched in 1986. United States leadership in advanced isotope and space reactor power systems will be maintained by coordinated efforts with NASA and DOD.

Specific expected accomplishments for FY 1983 are as follows:

- Complete the general purpose heat source-RTG qualification tests in support of the NASA flight programs.
- Conduct heat source fabrication, generator fueling, and flight acceptance testing.
- Complete the fueling and flight acceptance testing of first flight unit.
- Prepare the development plan, recommend the baseline design, and initiate component testing for SP-100 space reactor program.
- Complete updated Safety Analysis Report for Galileo RTG program.

NUCLEAR FUEL CYCLE

The Nuclear Fuel Cycle Program activities focus on development of the Liquid Metal Fast Breeder Reactor (LMFBR) fuel cycle and generic R&D on spent fuel storage. The former task provides for the development, design, and cold testing of advanced systems for the reprocessing of breeder fuel. The later task includes development of a Federal capability to store limited quantities of spent fuel on an "as needed and as authorized" basis pending repository availability.

LMFBR fuel cycle projects

LMFBR Fuel Cycle Projects efforts provide for the development and demonstration of advanced technology for reprocessing irradiated fuels from nuclear power reactors with the emphasis on the more stringent requirements associated with fast breeder reactor fuels. Cold engineering development work is carried out in the Integrated Equipment Test (IET) facility at the Oak Ridge National Laboratory and small scale hot cell work in the Solvent Extraction Test Facility (SETF). Design work will be conducted on small capacity demonstration alternatives.

Some of the FY 1983 expected accomplishments include:

- Complete fabrication of industrial standard electromechanical manipulators with advanced controls; initiate testing.
- Complete and install the IODOX unit in the Integrated Equipment Test (IET) facility.
- Install second 8-pack centrifugal contactor tank in the Remote Operation and Maintenance Demonstration (ROMD) section of IET.
- Conduct remote maintenance tests with the rotary dissolver in ROMD.

LWR fuel cycle projects

The LWR Fuel Cycle Projects consist of activities that relate to completing those steps in the LWR fuel cycle that occur after spent fuel is discharged from the reactor but before a repository is available for final waste disposal.

DOE activities will focus on interim storage including development and application of new or alternative commercial technologies for interim storage of LWR spent fuel. These technologies are needed to allow utilities or other private sector interests to provide safe, timely, and cost effective solutions to the impending need for additional interim spent fuel storage capacity. DOE will participate with utilities and industry in tests and demonstrations of alternative storage technologies to evaluate their safety and feasibility and to provide the base for Nuclear Regulatory Commission licensing requests.

DOE will conduct limited activities in FY 1983 relative to LWR fuel reprocessing as a continuation of actions authorized in FY 1982/1983 to restore and stabilize an environment in which private reprocessing can take place without inordinate risks due to Federal policy, regulatory, or political uncertainties.

COMMERCIAL WASTE MANAGEMENT (includes disposal fund activities)

The goal of the program is to provide the technology and facilities necessary to meet all applicable safety and environmental requirements for the long-term management of commercial nuclear waste. The Nuclear Waste Policy Act has specific requirements related to disposal activities which include: (1) to select the site for the first and second repositories by 1987 and 1990 respectively, with authorization to be issued by as early as 1990 and 1993, (2) to carry out a comprehensive program of consultation and cooperation with states and affected Indian tribes, including the provision of technical and financial assistance, and (3) studies on Monitored Retrievable Storage. In addition, the Secretary is authorized to construct a test and evaluation facility. The program is structured into three major program areas: (1) terminal isolation of spent fuel or reprocessed high level and other fuel cycle wastes, (2) waste treatment activities which integrate high-level, transuranic, and gaseous waste handling with repository and fuel cycle technology needs, and (3) assistance to the States in their responsibility for developing low-level waste disposal systems.

The reference repository schedule that calls for operations by 1998 is consistent with the schedule DOE committed to in the NRC waste confidence rulemaking. Should the NRC determine it does not have confidence that HLW can be disposed of in the time period proposed, impacts could include a moratorium on new reactors as well as the shutdown of existing reactors. The President signed the Nuclear Waste Policy Act of 1982 into law on January 7, 1983. The impact of this legislation on the reference repository schedule is being evaluated.

Expected FY 1983 accomplishments include:

- Initiate construction of exploratory shaft at the Hanford site.
- Select the site for the exploratory shafts in salt and in tuff.
- Complete a technical status report on the subseabed disposal option.
- Choose a commercial high level waste form.
- Establish and implement the Nuclear Waste Disposal Fee management program.
- Complete development of a regional Low Level Waste (LLW) data base.
- Complete processes for siting LLW disposal facilities in the humid East.

REMEDIAL ACTIONS

The Remedial actions program manages the cleanup radioactively contaminated Government-owned property that is now surplus to programmatic needs and private property contaminated by Government-contracted activities. The goal of this program is to perform surveillance, maintenance, and remedial actions on designated sites and facilities to preclude actual or potential health, safety, or environmental hazards; and to release these properties for alternative productive use with minimum or no restrictions. The program is structured into five major areas: (1) remedial action at formerly utilized Manhattan Engineer District and Atomic Energy Commission (MED/AEC) sites, (2) remedial action at Grand Junction, Colorado (P.L. 92-314, as amended); (3) remedial action at inactive uranium mill tailings sites (P.L. 95-604); (4) management of all radioactively contaminated DOE facilities declared surplus and resulting from civilian nuclear energy programs; and (5) the West Valley demonstration project (P.L. 96-368).

Expected FY 1983 accomplishments will include:

- Complete remedial actions at Bayo Canyon and the upper part of Acid Pueblo Canyon, both near Los Alamos, New Mexico, and initiate efforts at the Shpack landfill at Norton, Massachusetts.
- Complete remedial actions on 70 structures at Grand Junction, Colorado, for a total of 542 structures.
- Continue remedial actions at vicinity properties near the Canonsburg, Pennsylvania, and Salt Lake City, Utah, mill tailings sites; and initiate vicinity property work at the Grand Junction, Colorado site with the issuance of Final EPA standards, complete Remedial Action Plans so cleanup can be initiated on three high priority processing sites in FY 1984.
- Complete the engineering design work for decommissioning the Shippingport atomic power station at Shippingport, Pennsylvania; accelerate remedial actions activities at the Niagara Falls Storage site.

- Continue decontamination and restoration at the West Valley site to prepare the plant for solidification of liquid waste stored at the site.

FY 1984-86 PLANNED ACCOMPLISHMENTS

During the period FY 1984 through 1986 the course of the Nuclear energy programs will be dictated largely by the need to ensure that fission energy will be able to continue to play a key role in meeting the Nation's future power requirements. National energy policy stresses the importance of the present generation of fission systems--the light water reactor. The President's nuclear policy statement expresses a resolve to eliminate technical and institutional impediments to continued deployment of the light water reactor systems as well as to provide for new energy supply options.

The planned accomplishments are as follows:

CONVERTER REACTOR SYSTEMS

Light water reactor (LWR) systems

During FY 1982 the LWR systems program was redirected to (1) emphasize those technical activities which contribute to the resolution of the efforts on regulatory reform and (2) provide an improved public understanding of the key issues associated with nuclear power. The major planned accomplishments for this program in FY 1984 are:

- To concentrate efforts on ameliorating regulatory impacts and institutional impediments.

- To continue in the role of technical arbiter for LWR safety related items in order to reduce unrealistic requirements while maintaining and improving safety. To maintain the charter of providing a forum and internal organization that can successfully coordinate a comprehensive national safety program consistent with P.L. 96-567 in cooperation with industry, Nuclear Regulatory Commission, Agency Laboratories, other Government bodies and foreign nations. This effort will focus on avoiding unnecessary duplication while providing sufficient flexibility so each of the above participating organizations can discharge their individual responsibilities.

- To support the LOFT International program.

- To complete development of LWR extended burnup for one fuel design.

High temperature reactors

The High Temperature Reactor program will almost be completely terminated in FY 1983. Only insignificant test facility and equipment disposal completion related tasks will be required in FY 1984.

Three mile island (TMI) activities

During FY 1984 to FY 1986 period, it is planned to defuel the reactor. After defueling, the entire damaged core will be shipped off-site for examination in hot cells. The FY 1984 waste immobilization program efforts will investigate techniques for the treatment of abnormal wastes produced at TMI, including alternative immobilization concepts, confidence testing, and/or long term sample observation to provide an extensive data base. The Data Acquisition efforts will continue but the scope other than off-site core examination, will gradually be reduced as tasks are completed.

Advanced reactor systems

Funding for ongoing activities of this program is not being requested by the Agency in FY 1984, however, the Arms Control and Disarmament Agency is planning to request funding to support these activities in FY 1984.

BREEDER REACTOR SYSTEMS

Clinch River design will be completed and hardware fabrication and delivery will continue. Site preparation activities will be completed and construction of the plant buildings will be well underway. By the mid 1980's, the reactor operating floor and the reactor containment wall up to the dome will be completed; concrete wall and structural steel erection for other buildings will be in process; the reactor vessel and head will be set in place; installation of the steam generators will be well underway; and the primary heat transport system piping installation will have started. In the mid-1980's, the private sector, utilizing the data generated from LSPB, will make a decision on whether to proceed with detail design, construction and operation of a large scale breeder.

The breeder base program restructuring will begin in FY 1983 and will be in its stable configuration toward the end of the FY 1984-FY 1986 time period.

In FY 1984 the Breeder base program will continue on its path to industrialize the LMFBR by conducting the necessary R&D activities that are beyond the industrial capability, and by developing and testing certain critical plant components. The testing of the CRBRP prototype steam generator and pump will have been completed and efforts will be focussed on the preparations for testing the two stage primary pump and the helical coil steam generator. Installation of the secure automated fuel fabrication (SAF) line into the Fuel and Materials Examination Facility will be nearing completion.

The cooperative effort with industry and foreign countries to define implementation plans for proceeding with a large LMFBR plant will be completed in the mid 1980's. The product of this activity will be a detailed proposal that specifies the risk, roles, and responsibilities of all parties and that will form the basis for a decision by the private sector on whether to proceed with detailed design and construction of a large LMFBR plant.

The Water cooled breeder program provides for defueling activities and core evaluation efforts. In FY 1984 and beyond work will include completing LWBR core defueling, shipping and receiving spent LWBR fuel for core evaluation and conducting core examination and proof-of-breeding efforts.

ADVANCED NUCLEAR SYSTEMS

Space and special applications

The short-term objectives of the Space and special application program are to deliver to NASA three General Purpose Heat Source/Radioisotope Thermoelectric Generator (GPHS/RTG's) for the Galileo orbiter spacecraft; and to deliver one GPHS/RTG for the International solar polar mission (ISPM) spacecraft on a revised schedule for their 1986 launches; to fabricate selected components for long-term life tests for the Agency/NASA/DoD space reactor SP-100 development program. Some of the specific FY 1984 planned activities are:

- o Deliver two thermoelectric flight converters to Mound Facility.
- o Complete fueling and flight acceptance testing of the third Galileo and the ISPM RTG.

- Publish the Final safety analyses report for the Galileo RTG program.
- Complete the Updated safety analysis report for the ISPM RTG Program.
- Initiate design, fabrication, and assembly of a ground demonstration unit for the Advanced modular isotope thermoelectric generator.
- Continue the development of the space power advanced reactor system (SP-100) in cooperation with NASA and DoD.

NUCLEAR FUEL CYCLE

LMFBR Fuel cycle projects

FY 1984-96 activities include:

- Fuel disassembly and shear systems completed and installed in the Integrated Equipment Test (IET) facility.
- Complete tests of remotely maintainable centrifugal contactor in the Remote Operation and Maintenance Demonstration (ROMD) section of IET; install in the Integrated Process Demonstration (IPD) section.
- Full operation of the IET facility to provide systems operating and performance experience and facility design data, including small capacity reprocessing demonstration alternative equipment; fabrication of selected small capacity developmental equipment items.

LWR fuel cycle projects

Specific objectives to be accomplished in FY 1984 include:

- Work with the NRC to provide an improved regulatory and licensing environment for commercial reprocessing.
- Prepare and submit report/proposal to Congress on interim spent fuel storage system.
- Complete guidelines and contracts for acceptance of spent fuel for Federal interim spent fuel storage.
- Support cooperative licensed/unlicensed cask storage and transportation demonstrations with utilities and industry.
- Conduct dry and wet fuel integrity monitoring at Battelle Columbus and HEDL to support safety of extended storage in response to NRC concerns.

COMMERCIAL WASTE MANAGEMENT (includes disposal fund activities)

The near term (FY 1984-1988) terminal isolation activities are directed at submitting a repository license application early in FY 1988. The FY 1988 license application date is critical to maintaining the reference schedule for operating a licensed geologic repository no later than in the FY 1995-2001 time period.

On January 7, 1983, the President signed into law the Nuclear Waste Policy Act of 1982. Impacts of this legislation on the program and funding estimates are being evaluated.

Specific objectives for FY 1984 to 1988 are:

- Continue the terminal isolation program with completion of exploratory shafts.

- o Select one site in late FY 1987 for further detailed investigations to support submittal in early FY 1988 of a license application for construction of the first geologic repository. Possible options to accelerate this date will be evaluated.

- o Continue site screening and evaluation of additional sites for a second repository with selection of sites for exploratory shafts made in 1989.

- o Continue to assist states in the forming of new regional low level waste disposal sites by 1986. The Low-Level Waste (LLW) program will be reduced in level of support after 1986 and its principle focus will be on analysis of the operation of the overall national system for LLW management.

- o Convert the "cold" sodium cleaning facility to "hot" operations to demonstrate processing some of the contaminated sodium from EBR-II operations and maintenance and develop criteria for contaminated sodium handling and treatment.

Remedial actions

Specific objectives for FY 1984 to 1988, formulated in response to Public laws, are:

- o Develop and conduct the West Valley demonstration project to solidify the high level liquid wastes at the site.

- o Seek legislation to authorize additional MED/AEC sites.

- o Continue the cleanup activities at Grand Junction to allow completion by FY 1985.

- o Continue remedial action at inactive mill tailing sites.

- o Conduct the decontamination and decommissioning of the Shippingport reactor.

- o Continue the MED/AEC activities to allow completion of the 14 authorized sites by FY 1992.

- o Continue the surplus facilities activities.

POLICY AND MANAGEMENT

The objective of this activity is to support the immediate Office of the Assistant Secretary for Nuclear Energy, including planning, evaluation and resource management.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Converter reactor systems (NE)				
High temperature reactors				
Operating expenses	$ 33,500	$ 33,008	$ 33,008	$ 0
Capital equipment	1,800	2,280	2,280	0
Subtotal	35,300	35,288	35,288	0
Light water reactor systems				
Operating expenses	21,600	10,000	10,000	15,000
Capital equipment	523	0	0	0
Subtotal	22,123	10,000	10,000	15,000
Three mile island (TMI) activities				
Operating expenses	23,750	24,000	24,000	33,000
Capital equipment	8,000	5,000	5,000	4,000
Subtotal	31,750	29,000	29,000	37,000
Advanced reactor systems				
Operating expenses	3,935	3,985	3,985	0
Capital equipment	200	200	200	0
Subtotal	4,135	4,185	4,185	0
Program direction				
Operating expenses	1,422A/	359A/	359A/	1,190
Subtotal	1,422	359	359	1,190
Total				
Operating expenses	84,207	71,352	71,352	49,190
Capital equipment	10,523	7,480	7,480	4,000
Converter reactor systems	$ 94,730	$ 78,832	$ 78,832	$ 53,190
Staffing FTP/Total FTE's	27/28B/	14/15	14/15	15/15

Authorization: Section 31, P.L. 83-703 and P.L. 96-567.

A/ Reflects comparability adjustments of -$78,000 in FY 1982 and FY 1983.
B/ Consistent with the FY 1984 structure, an adjustment of 13 FTE/FTP's, from Converter reactor systems to Breeder reactor systems should have been made.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Converter Reactor Systems
(In thousands of dollars)

FY 1983 Appropriation	$ 78,832
Built in increases and decreases:	0
FY 1984 Base	78,832
Program increases and decreases:	
High temperature reactors (HTR)	- 35,288
o Orderly closeout of HTR.	
Light water reactor (LWR) systems	
o Closeout of LWR Institutional and safety activities, except for in-house efforts	- 5,000
o Orderly closeout of LWR Extended Burnup program	- 5,000
o LOFT International activities	+ 15,000
Three Mile Island (TMI) activities	
o Full implementation of reactor evaluation and waste immobilization activities, including initiation of reactor defueling	+ 8,000
Advanced reactor systems	
o Transfer funding responsibility to ACDA in FY 1984 and thereafter	- 4,185
Program direction	+ 831
FY 1984 budget request	$ 53,190

The Converter reactor systems program is conducted under the Assistant Secretary for Nuclear Energy. The FY 1984 budget authority request for this program is $53,190,000, a $25,642,000 decrease from the FY 1983 appropriation. The major changes are increases in the Light water reactor systems program and Three mile island activities and the phasing out of the High temperature reactor program and Advanced reactor systems program.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Converter reactor systems	$ 78,832	$ 78,832	$ 53,190

The overall objective of the Converter reactor systems program is to remove the institutional, financial, technical and regulatory barriers to the further deployment of Converter reactors by private industry. Within the context of this objective, this budget document describes the funding levels for the following program elements: High temperature reactors, Light water reactor systems, Three mile island activities and program direction. General nuclear related studies, assessments and nuclear training programs are also included and supported under each of the program elements listed below.

High temperature reactor (HTR)	$ 35,288	$ 35,288	$ 0

Due to its advanced development status, including an existing commercial plant in operation, no funding is being requested for the High Temperature Gas-Cooled Reactor Program. The focus of the FY 1983 program will be to continue ongoing technology and conceptual design tasks for the steam cycle/cogeneration configuration of the Lead Plant design. Application and related design and technology studies of advanced and higher temperature modular reactor systems will also be completed and terminated in an orderly manner.

Light water reactor (LWR) systems	$ 10,000	$ 10,000	$ 15,000

The overall objective of the LWR systems program is to help to remove the obstacles to the further deployment of Light Water Reactors by private industry.

These objectives will be achieved through a coordinated program with other government agencies and industry to develop and implement recommendations to resolve the regulatory, financial and technical problems of the LWR industry.

Operating expenses	$ 10,000	$ 10,000	$ 15,000

This program element consists of three subprograms: LWR Institutional and safety, including LOFT, LWR extended burnup, and LWR radiation dose reduction.

Institutional and safety

The objectives of the Institutional and safety element are:

1) to develop and implement initiatives of an institutional nature which may require new legislation, new federal government rules and procedures, and different federal, state, and private sector roles in the nuclear industry.

2) to develop the technical, financial and legal basis required to implement the regulatory, financial and institutional reforms required to revitalize the U.S. nuclear industry.

With respect to the first subelement, institutional improvements will be pursued in three areas: a) the nuclear regulatory process; b) the institutional infrastructure regarding powerplant financing; c) those institutional relationships which currently adversely affect the construction, operation, and maintenance of nuclear powerplants.

The primary objective related to the nuclear regulatory process is to make it more stable, predictable and efficient. Of primary importance are those applicants currently involved in that process; secondly will be changes that can make the process more attractive for potential future applications.

The utility financing area reflects back to the Energy Reorganization Act (P.L. 95-91), whose purpose is to promote the interest of consumers through the provision of an adequate and reliable supply of energy at the lowest reasonable cost. For financial reasons, many utilities have not been able to make decisions consistent with optimum use of natural resources or which will meet long-term energy and capacity needs. In order for the United States to be in a position to meet future electrical energy needs which will contribute to a healthy National economy, the Department of Energy must take action to determine what can be achieved in terms of regulatory reform to assure a viable utility industry. In conjunction with other elements of DOE, it is planned to evaluate those financial and economic factors which have resulted in the present problem and to recommend those actions which will help restore the financial condition of nuclear electric utilities.

All efforts under this subelement will be done in-house in FY 1984, utilizing Federal employee salary funds contained in the Program Direction line item.

The second subelement related to technical support is limited at present to the LOFT International Program and the coordination of the overall national safety R&D program with industry, NRC, national laboratories, other government bodies and foreign programs.

The LOFT program is a cooperative internationally funded activity. The program will assimilate the concluding NRC R&D programs with LOFT and will make use of the unique capabilities of the LOFT facility to provide the necessary data to reduce uncertainties in primary and containment system responses to severe transients and accidents. Nine tests are planned over the 3-year period with a final severe test to mockup actual fission produced releases from a fuel melting accident. The program will be directed by a consortium of the participants and will rely heavily on input from the nuclear industry. The participation of industry is expected to result in greater focus on economic as well as safety related improvements. (Program costs from FY 1983 through FY 1986 will be $93.5M. Of this, $25.0M is FY 1983 NRC LOFT program funds, $15.0M is FY 1983 NRC funds related to LOFT decontamination and decommissioning that have been committed to by NRC but not yet appropriated by Congress, $30.0M is new DOE program funds, and $23.5M will be contributed by foreign countries.)

The Department's effort to coordinate the development and implementation of a DOE/NRC/Industry cooperative national safety program involves definition and prioritization of issues and identification of effort to resolve issues. The program has been divided in two phases--a program definition phase and a program implementation phase. Program needs and priorities were defined by utilizing working groups composed of representatives for DOE, NRC, industry, and national laboratories to assist the DOE in both the program definition and program implementation phases. DOE convened 10 of these working groups and their membership and a schedule of activities have been provided to Congress in our response to Public Law 96-567. All efforts under this subelement will be done in-house in FY 1984 utilizing Federal employee salary funds contained in the Program Direction line item.

LWR extended burnup

The extended burnup subprogram has through FY 1983 consisted of (1) major projects to prove extended burnup performance of specific fuel designs conducted by electric utilities teamed with each of the five LWR fuel vendors, and (2) several smaller projects to obtain basic data on extended burnup phenomena needed for design and licensing. In FY 1984, the basic data effort will be continued using funding still available from prior years' appropriations, and one major project will be continued with one utility/vendor team with the objective of completing the work on one fuel design only. The other major cost-shared contracts to develop other fuel designs will be cancelled. The continuing efforts will provide a portion of the fuel design and performance information needed to achieve the target burnups of this subprogram. Private sector organizations such as the fuel vendors, utilities, and EPRI may have to conduct the balance of the previously planned program activities without Government assistance.

LWR radiation dose reduction

No funds are being requested for this program in FY 1984. The phase out of ongoing projects is being carried out using funds provided in prior years. Implementation of technologies in this program will be the responsibility of the private sector.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 0	$ 0	$ 0

No equipment funding is being requested in FY 1984.

Three mile island (TMI) activities	$ 29,000	$ 29,000	$ 37,000

The objectives of this program are to acquire information and conduct relevant R&D that will substantially enhance nuclear powerplant safety, reliability, and operation; and ensure the means to safely dispose of abnormal nuclear wastes resulting from an accident are developed.

In consonance with the Administration's policy of retaining responsibility for commercial nuclear power activities in the private sector, the Department's TMI program is limited to necessary research and development only. Responsibility for the costs of TMI cleanup remain with General Public Utilities (GPU), the owner of the facility.

The TMI activities are being implemented in accordance with a memorandum of understanding signed by DOE, NRC, EPRI, and GPU. The efforts of GPU are aimed at plant cleanup and recovery. The Department has developed a program work scope that enables obtaining important R&D information that would not otherwise be available from the TMI-2 cleanup effort. The DOE program is being conducted in a manner that avoids delaying the GPU cleanup schedule.

In accordance with a Memorandum of Understanding between the DOE and the Nuclear Regulatory Commission, the Department will acquire radioactive waste including the damaged core from TMI for research and development, and for disposal. In those cases, where there is no research value associated with the waste acquired by the DOE, the owner, GPU, has agreed to pay costs associated with shipment and disposal.

Operating expenses	$ 24,000	$ 24,000	$ 33,000

The Department's TMI activities program has two major elements: TMI data acquisition program and TMI waste immobilization and reactor evaluation program.

TMI Data Acquisition Program	$ 7,000	$ 7,000	$ 9,500

The objective of this subprogram is to obtain important R&D data which is of generic value to the safety of light water reactors.

The DOE and EPRI are each sharing responsibility for portions of this R&D program scope. Specifically, the Department is funding data gathering, research and development, and information transfer in the following major areas: instrumentation and electrical equipment survivability; behavior of radioactive products; data system and specimen archiving; and offsite fuel debris examination. EPRI has similar responsibility for mechanical and structural component reliability, pressure boundary recharacterization, and decontamination and dose reduction associated with the primary coolant system.

In FY 1984, DOE plans to conduct the in-situ and offsite examination of selected instrumentation and electrical components to ascertain their condition, cause of failure, and features which affect survivability. Data obtained will be used to upgrade qualification standards, regulatory guides, and operating and maintenance standards, in order to improve operation of nuclear plants during transients. Efforts will continue on taking and analyzing solid, liquid and gaseous samples to identify how various radioactive isotopes, which were released within the containment building during the accident, were transported and deposited. These data will be valuable in assessing the existing models for fission product release which are used in nuclear powerplant licensing. Efforts to prepare for the offsite fuel debris examination will be continued. The actual fuel examination work will not begin until after the reactor is defueled. The technical integration office will continue its program management activities at the TMI-2 site. The computer data bank system will continue to operate and collect, store and transfer the data and documentation generated by the Department's program during the GPU cleanup effort.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
TMI Waste Immobilization and Reactor Evaluation	$ 17,000	$ 17,000	$ 23,500

The objectives of this subprogram are: (1) to conduct research and development on immobilization of abnormal reactor waste products, and (2) to examine the TMI-2 reactor and core components in-situ and to support development activities associated with the reactor defueling; the data and information acquired will provide an improved basis for evaluation of licensing criteria and requirements, analyzing causes and consequences of accidents, and improving the reliability of the design and operation of LWR's. This program element was initiated in FY 1982.

The waste management and immobilization activities are initially being focused on an effort to demonstrate the feasibility of vitrifying zeolite ion exchange materials. The program will have demonstrated this feasibility in FY 1982 and FY 1983.

Beginning in FY 1983 and continuing in FY 1984, this subprogram is also focusing on other techniques for the treatment of abnormal wastes produced at TMI, including alternative immobilization concepts for inorganic ion exchange zeolites and organic resins, confidence testing and long term sample observation to provide a more extensive data base. Some of the areas which will be addressed by the program include demonstration of liner disposal in a high integrity container, resin solidification and lysimeter testing. The knowledge gained from this program will contribute substantially to the technology for processing and disposing of unique waste forms resulting from commercial nuclear powerplant abnormal operations and accidents.

The reactor evaluation activities include development associated with the examination, removal, and disposition of the reactor core and internals, and the special systems, equipment, facilities, and processes needed to accomplish the defueling operation and supporting onsite examinations, tests, and evaluations of this fuel effectively and expeditiously.

Principal efforts will be directed to the goal of removing the reactor head late in FY 1983. In parallel, the development and engineering of systems, equipment and procedures for reactor plenum removal and storage, and for reactor defueling and fuel transfer will be initiated. In FY 1984, the plenum removal will be accomplished and core disassembly activities will be intensified. The development work will be directed toward a thorough examination of the reactor internals and core, and performance of the defueling effectively and in a radiation environment as low as practicable. Substantial beneficial information and data on the condition of the reactor, core and other internal components will be obtained. In addition, preparations will be made to perform extensive off-site examinations of the fuel and debris and other reactor internal components to characterize the accident effects.

The knowledge gained from this program will provide data required for evaluating present licensing criteria and requirements; developing future licensing criteria; assessing and developing computer models used to analyze the course and consequences of severe accidents and means to mitigate the effects of such accidents; and evaluating improvements to reactor design, operation, and maintenance.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 5,000	$ 5,000	$ 4,000

The two TMI subprograms are discussed below:

TMI data acquisition program	$ 2,000	$ 2,000	$ 3,500

This funding is required for the detailed design, fabrication and installation of specialized instrumentation, surveillance, measurement and handling equipment. This equipment is required to perform tests on electrical equipment and water, gas and material samples. This equipment is also required for testing advanced decontamination and waste handling techniques, equipment and containers required for packaging, shipping and disposal of test specimens and residues after testing. Equipment is also required for testing and examination of the core and reactor components which have been removed. These test specimens require unique hot cell equipment and capabilities.

TMI waste immobilization and reactor evaluation	$ 3,000	$ 3,000	$ 500

This request provides equipment required for examination of core and reactor components and developmental equipment required for defueling and shipment of the damaged core; equipment required to perform R&D on abnormal wastes produced at TMI-2; and unique equipment required for ultimate disposition of the damaged core and high level waste products.

Advanced reactor systems	$ 4,185	$ 4,185	$ 0

Funding for this program is being requested by ACDA for FY 1984 and thereafter.

Program direction	$ 359	$ 359	$ 1,190

The full time equivalents and associated funding required to manage the Converter reactor systems program in FY 1984 totals 15 full time equivalent positions and $1,190,000. The personnel required includes administrative and technical talent who manage a broad range of activities, which includes research, development, demonstration, industrial involvement, and international programs.

The headquarters personnel responsibilities include the establishment of broad objectives, scopes of work, general resource program levels, and broad technical management interfaces necessary for program direction. These responsibilities include assessment of the technical progress, milestone progress, cost expenditures, guidance, overview and integration of all the contractor's activities, and initiation of appropriate actions to resolve problems in any of these areas. Further, the responsibilities include administrative aspects such as budgeting, preparing financial plans, long and short range program planning and personnel activities.

Also, headquarters personnel handle active interfaces with other Executive Branch agencies such as the Department of State, Nuclear Regulatory Commission, the Office of Management and Budget and respond to numerous public and Congressional inquiries. Other interfaces are maintained with the nuclear industrial community and contractors including Electric Power Research Institute, the utility industry, major suppliers such as General Electric and Westinghouse, the National laboratories, universities, foreign reactor operators, and foreign fuel fabrication organizations.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

Commercial Waste Management (NE)	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Terminal Isolation Generic R&D				
Operating expenses	$178,835	$ 21,600	$ 21,600	$ 4,700
Capital equipment	9,017	400	400	0
Subtotal	187,852	22,000	22,000	4,700
Waste Systems Technology				
Operating expenses	8,815	8,925	8,925	9,440
Capital equipment	100	470	470	360
Subtotal	8,915	9,395	9,395	9,800
Waste Treatment Technology				
Operating expenses	3,470	6,603	6,603	5,600
Capital equipment	740	1,000	1,000	0
Subtotal	4,210	7,603	7,603	5,600
Pacific Northwest Laboratory Landlord				
Capital Equipment	900	1,200	1,200	600
Construction	1,100	1,100	1,100	1,400
Subtotal	2,000	2,300	2,300	2,000
Program Direction				
Operating expenses	2,125a/	871a/	871	480
Total				
Operating expenses	193,245	37,999	37,999	20,220
Capital equipment	10,757	3,070	3,070	960
Construction	1,100	1,100	1,100	1,400
Commercial Waste Management	$205,102b/	$ 42,169c/	$ 42,169	$ 22,580
Staffing FTP/Total FTE's	51/51	12/12	12/12	8/8

Authorization: Sec. 31, P.L. 83-703

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a/ Includes a comparability decrease of $857,000 in FY 1982 and FY 1983 to reflect the transfer of program direction funding to the Remedial Actions decision unit. It also includes a reduction of $142,000 in FY 1982 and FY 1983 for 3 positions transferred to NE policy and management.

b/ Includes waste treatment comparability decrease of $765,000 operating funds and of $320,000 equipment funds for airborne waste transferred to the fuel cycle decision unit.

c/ Includes comparability increases of $6,603,000 operating funds, of $2,200,000 equipment funds and of $1,100,000 construction funds for HLW/TRU and PNL landlord transferred from the Fuel Cycle decision unit.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Commercial Waste Management
(Dollars in Thousands)

FY 1983 Appropriation Enacted	$ 42,169
Built in increases and decreases	0
FY 1984 Base	$ 42,169
Program increases and decreases:	
Terminal Isolation Generic R&D o Reflects progression from generic Terminal Isolation R&D to project-specific development which is funded in the Nuclear Waste Fund.	-17,300
Waste Systems Technology o Provides technical assistance to States in establishing regional compacts for low-level waste disposal and support analysis for improving other waste treatment and disposal technologies.	+ 405
Waste Treatment o Reduces development of waste technology to support handling and disposal of transuranic and high-level wastes.	- 2,003
Pacific Northwest Laboratory Landlord o Reduces facility and site support funding to the Pacific Northwest Laboratory.	- 300
Program Direction o Reflects reduction of 4 FTE's associated with the reduced terminal isolation efforts.	- 391
FY 1984 Budget Request	$ 22,580

The Commercial Waste Management program is conducted for the Department under the Assistant Secretary for Nuclear Energy. The FY 1984 budget request for this activity is $22,580,000, a decrease of $19,589,000 below the FY 1983 level. The major decrease in the FY 1984 budget request is in the Terminal Isolation program area. All project-specific activities have been deleted from this budget area and included in the Nuclear Waste Disposal Fund decision unit. The base program and FY 1984 request is explained in detail in the following narrative.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Commercial Waste Management	$ 42,169	$ 42,169	$ 22,580

The objective of the Commercial Waste Management Program is to support technology related to the long-term management and disposal of commercial radioactive waste. Specific activities include: (1) basic generic R&D for the geologic disposal of commercial waste; (2) assistance to the States to develop regional compacts for the disposal of low-level waste; (3) development of waste treatment and solidification processes suitable for preparing nuclear wastes for storage or disposal in a repository; and, (4) studies to support the combined commercial waste management activities, to obtain international and technical review coordination. Other special studies and support include general nuclear-related studies, assessments and nuclear-training programs.

Congress has enacted National Nuclear Waste Disposal legislation that requires the government to provide a mined geologic disposal facility in return for utilities agreeing to pay the full cost of these development activities. These activities which were previously part of the Commercial Waste Management budget are now included in the Nuclear Waste Fund budget.

The Commercial Waste Management program is composed of five activities: Terminal Isolation Generic R&D; Waste Systems Technology; Waste Treatment; Pacific Northwest Laboratory Landlord; and Program Direction. These activities are justified below:

A. Terminal Isolation Generic R&D	22,000	22,000	4,700
Operating expenses	21,600	21,600	4,700

The terminal isolation activities are generic R&D associated with the disposal of commercial waste in mined geologic repositories. In FY 1984 only the subseabed R&D will remain in the terminal isolation program. All other generic R&D will be completed in FY 1983. Subseabed disposal will continue to be studied as an international long-term alternative to mined-geologic disposal. Specific research efforts in cooperation with other countries will include engineering studies of emplacement techniques, thermo-mechanical studies of sediments, research cruises to evaluate sites, in-situ heat transfer experiments, and supporting laboratory and analytical studies. These efforts are all directed toward establishing feasibility of the subseabed disposal concept. If feasibility is established, it will provide the basis for removal of institutional restrictions on disposal in subseabed.

The FY 1983 repository siting activities include development of measurement methods for laboratory testing of host rocks and radionuclide migration through rocks. An integrated generic performance assessment model to predict potential release and migration rates from a repository will be developed. The preliminary waste acceptance criteria and specifications will be defined. The FY 1983 repository development activities also include completing development and testing of repository sealing and back fill systems. Equipment and instrumentation for in-situ testing and performance monitoring will be developed and tested. The international test programs at the Stripa mine in Sweden and Asse mine in the Federal Republic of Germany will continue as will the activities with Canada on a test facility. A technical status report focused on the critical feasibility issues for the subseabed disposal concept will also be completed.

Commercial Waste Management - continued

In FY 1984 the Generic R&D activities will include only subseabed. Specific activities include the completion of sediment models for predicting the effects of emplaced waste. A free fall and boosted pentrometer tests and an in-situ heat transfer experiment will be designed. These tests are precursor to determining the feasibility of subseabed disposal. These efforts will lead to the completion in FY 1991 of the assessment of this disposal concept feasibility.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 400	$ 400	$ 0

The FY 1983 funding provided for laboratory test equipment to evaluate waste form characteristics, waste package materials, repository seal performance, and performance assessment modeling equipment. Also included were computers for earth science data acquisition and performance modeling. Capital equipment funding is not requested in FY 1984 for the Terminal Isolation Generic R&D program.

B. Waste Systems Technology	9,395	9,395	9,800

The Waste Systems Technology program includes two tasks: Supporting Studies and Low-Level Waste. These tasks are justified below:

Operating expenses	8,925	8,925	9,440
B.1. Supporting Studies	2,000	2,000	1,600

The Supporting Studies task includes three main areas of effort: international program support, special technical reviews by prestigious scientific groups, and independent assessment of programmatic and institutional issues. The thrust of these efforts is to assure adequate international cooperation, to provide an independent assessment of the technical adequacy of the program, and to evaluate potential alternatives which could improve the cost, schedule or technical aspects of the Commercial Waste Management programs.

During FY 1984 the International program efforts will support international, bilateral and multilateral agreements. Summary reports will be prepared on the various international programs of the various countries emphasizing the status and planning of international waste management activities. International cooperation on testing projects and exchange of information provides the fundamental basis for countries to resolve the pressing issue of disposal of Nuclear Waste. The information exchange contributes to the development of international consensus on the adequacy and safety of geologic disposal of Nuclear Waste. At present there are agreements governing information exchange with six countries. A new multilateral agreement, was added in FY 1982 with the Commission of the European Countries. Discussions with four additional countries are expected to result in later agreements. FY 1983 will see the start of an expanded program initiated by the Administration to expand the Nuclear Energy Agency program in waste management. This International program responsive to P.L. 97-425 recently enacted by Congress. This effort will continue in FY 1984.

During FY 1984 support of special technical reviews by the National Academy of Sciences will continue. Effort will also continue on independent assessment of technical and programmatic issues related to the integration and conduct of the Waste Management and Fuel Cycle activities. Sensitivity analysis of cost or schedule impacts of various alternatives will be conducted. General quality assurance support, socioeconomic analysis and environmental impact statement support will also be provided.

Commercial Waste Management - continued

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
B.2. Low-Level Waste	$ 6,925	$ 6,925	$ 7,840

Public Law 96-573, the Low-Level Radioactive Waste Policy Act, assigned States the responsibility for assuring disposal capacity for commercial low-level radioactive waste (LLW) generated within their borders. The formation of regional compacts to satisfy this responsibility was encouraged by the law. The goal of the Department's LLW program is to assist States in the development of an effective national LLW management system by 1986 and to evaluate this system in terms of operational efficiency by 1988. Presently, only three LLW disposal facilities operate in the commercial sector. It is estimated that the United States will exhaust its existing capacity for LLW disposal in the early 1990's if the current system is not changed. It is also recognized that technology exists today to dispose of LLW adequately, but improvements in specific practices, techniques, and procedures can result in a more efficient and uniform system for LLW disposal. Accordingly, to achieve the second part of the program's goal it is necessary to improve, document, and develop new methods for information management, waste packaging and treatment, shallow land burial, and measures to correct existing disposal site problems. The program's goal is accomplished through:

1) identification of national, State, and regional waste management needs;

2) application, where appropriate, of developed technology to meet these needs;

3) specification of new or improved practices, techniques, and procedures; and

4) integration of State and regional needs and the application of technological practices and procedures into a cohesive program plan.

The specific objectives of the LLW program are to facilitate the establishment of a reliable system for treatment and disposal of LLW, to facilitate the formation of regional compacts of States to manage their LLW, to make available related technology for private sector use in LLW treatment and disposal, and to foster cooperative technology development demonstrations with the States and industry. During FY 1982, the program prepared a strategy that provided a generic basis for the Department's assistance to States and the improvements in LLW management technology. Federal assistance to States includes: comprehensive planning, information gathering and analysis, waste treatment analyses, disposal site screening and selection methods, site characterization studies and the demonstration of improved technologies for treating and disposal of LLW. The technical program is focused on waste forms for disposal and volume reduction processes, radionuclide migration in shallow land burial sites, and disposal site stabilization. The LLW management systems analysis model and data base developed on a national basis has now been tested at a State level.

During FY 1983, the Program will complete the development of the regional LLW data base, continue State/regional technical and financial assistance in support of P.L. 96-573, complete processes for siting disposal facilities in the humid East, initiate a lysimeter program that can determine radionuclide migration at arid disposal sites, complete power reactor incinerator licensing documentation studies, and initiate work on a system conceptual design for advanced reactor solid waste treatment systems.

The LLW program in FY 1984, an increase of $1,433,000 over FY 1983, will provide technical and financial assistance to States and regions to support selection and operation of new LLW disposal facilities by 1986 (primarily through compacts), will support remedial actions at the Kentucky LLW disposal facility, will demonstrate advanced waste volume reduction systems for solid and liquid reactor wastes, and initiate additional LLW

Commercial Waste Management - continued

demonstrations related to radionuclide migration. For example, Colorado as lead for the Rocky Mountain Compact has primary responsibility for the development of the compact. The Department's assistance covers technical aspects of meetings for compact negotiation and compact issue studies. These include: economic considerations, regulatory authority options, co-siting of LLW disposal sites and uranium mill tailings or formerly utilized sites, facility site selection processes, acquisition of Federal land for a disposal site, optional waste management practices, existing State siting authorities, generic siting criteria for the region and future LLW generation rates. Finally, the State has agreed to develop a regional strategy and plan for siting and licensing a disposal facility in the Southwest. The program will also continue to foster transfer to the private sector of improved technologies for LLW management developed through other Departmental programs.

The LLW program is a key element to the successful implementation of a regional system of disposal facilities. The program allows States to rely on Departmental operating experience in LLW disposal to establish the necessary institutional framework and technology techniques to operate new LLW disposal facilities and improved LLW management systems.

In FY 1987 this current program of technical assistance in developing new LLW disposal sites will be reduced in level of support and phased out by FY 1989. The principle focus after 1986 will be an analysis of the operation of the overall national system for LLW management. For the long term, States and/or regional compacts are expected to assume the costs for technical improvements and operation of the overall system through appropriate user fees. Departmental involvement in commercial low level waste management after FY 1988 is expected to be for maintenance of wastes and lands related to closed disposal sites transferred to the Secretary for protection of the public health, safety and the environment as provided for in the Nuclear Waste Policy Act of 1982.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 470	$ 470	$ 360

Capital equipment funds are required to purchase equipment hardware for a computer base tracking system and associated software for a low level waste cradle to gravel manifest record system. Funding is also required for development of equipment to volume reduce reactor waste more cost effectively.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
C. Waste Treatment	7,603	7,603	5,600
Operating expenses	6,603	6,603	5,600

The objective of this program is to develop and demonstrate technologies for the treatment and immobilization of nuclear fuel cycle radioactive wastes in a form acceptable for transportation, storage and ultimate disposal in a licensed repository. Specifically, high-level waste, transuranic waste, and contaminated sodium waste treatment processes are addressed. Over the years methods for treating high-level and transuranic wastes have been developed but recent work has occurred primarily in other countries. Experience and data from these past efforts is now utilized to focus this program on determining the long-term reliability and maintainability of improved prototypical waste treatment systems, to test and select acceptable waste forms for storage or permanent disposal in licensed facilities, and to demonstrate the adequacy of these technologies through their application to specific Departmental waste treatment efforts such as those at West Valley and Three Mile Island (TMI). Activities in this program are coordinated with other Departmental efforts related to fuel reprocessing, generation of special wastes, transportation, and terminal isolation of Departmental and commercial wastes.

Commercial Waste Management - continued

In FY 1983, the performance requirements and specifications for high-level (main focus) and transuranic waste forms and their containers will be developed. The adequacy of a glass waste form to meet these performance requirements will be examined. A reference waste form for commercial high-level wastes will be selected. In the waste immobilization area, emphasis will be on the latest technology for waste vitrification, the liquid fed ceramic melter. Improvements will be made in performance of the melter feed, off-gas and waste glass canister treatment systems. Preparation for furthering development and evaluation of a waste form alternative to glass will also be undertaken.

The transuranic waste treatment program (TRU) is combined with the high-level waste program (HLW) to ensure consistency and to seek synergistic solutions to HLW and TRU waste problems. TRU waste streams typical of commercially-generated wastes will be quantified, their relationship to HLW treatment solutions defined, and new or improved treatment technologies will be developed.

A process to treat contaminated sodium and sodium-bearing components has been developed. In FY 1983 a system based on this technology will be demonstrated nonradioactively by using a melt-drain-evaporation-calcination process. Since untreated sodium cannot now be disposed of in burial sites, criteria for the shallow land burial of sodium contaminated wastes will be developed. This technology supports breeder reactor development as well as helping to resolve existing problems with treatment and disposal of untreated, contaminated sodium now held in storage by the Department.

In FY 1984, waste solidification activities will focus on vitrification process controls and quality verification methods for demonstrating that the glass waste products meet the required specifications developed in FY 1983. Specifications for transuranic wastes will be completed in FY 1984 and transuranic waste treatment processes development will continue in preparation for future demonstration of these techniques on actual wastes. These activities will be conducted in the context of the types of wastes that are anticipated from the commercial nuclear power fuel cycle. Applications of these technical developments (e.g., vitrified waste formulations, high-level and transuranic waste product specifications, vitrification system design and testing) will be carried out through technical support to the TMI and West Valley projects, breeder reactor fuel cycle activities, and treatment of special wastes as required. Future application of these waste treatment and immobilization technologies for commercial nuclear fuel reprocessing will be evaluated.

In FY 1984 the sodium treatment facility will be converted to handle radioactive materials and will process contaminated sodium from the Experimental Breeder Reactor-II (EBR-II) operations utilizing the system demonstrated in FY 1983. Criteria and guidance for shallow land burial of sodium contaminated wastes will be tested and completed.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital Equipment	1,000	1,000	0

The FY 1983 equipment was required to make significant improvements in vitrification facility off-gas treatment and monitoring systems, upgrade the control instrumentation for the liquid fed ceramic melters, obtain analytical instruments for use in characterizing the product waste forms, and equipment for converting recovered sodium waste to a product acceptable for land disposal.

Commercial Waste Management - continued

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
D. Pacific Northwest Laboratory Landlord ..	$ 2,300	$ 2,300	$ 2,000
General purpose equipment	1,200	1,200	600

General purpose equipment is necessary to support the Pacific Northwest Laboratory (PNL) at Richland, Washington. These funds are provided under the landlord responsibility and will be used for such items as safeguards equipment, radiation and environmental monitoring equipment, precision shop machinery and equipment, and other laboratory instrumentation needed to meet the requirements of the Department's programs conducted at that site.

Construction	$ 1,100	$ 1,100	$ 1,400

Provides funds for General Plant Projects at the Pacific Northwest Laboratory (PNL) at Richland, Washington. These are miscellaneous projects of a capital nature which are necessary to maintain continuity of operation and protection of the environment, and to provide safeguards for the protection of life and property. Such projects supported under the landlord responsibility include general additions, improvements, and replacements of structures, building services, utilities, and road repairs.

In FY 1984, General Plant Project modifications to the PNL Engineering Development Laboratory (314) and miscellaneous capital work orders such as filtration systems, fire sprinkler systems, cranes, etc., will be provided. These projects are specifically identified in the Construction Project Data Sheet, Project No. 84-N-105.

E. Program Direction	871	871	480

The Commercial Waste Management program direction FY 1984 budget request is $480,000, a decrease of $391,000 from the FY 1983 budget amount. This budget provides funding for 8 full-time equivalents which is a decrease of 4 FTE's from FY 1983. The budget covers employee salaries, overtime, incentive awards, severance pay, benefits and the travel directly related to program accomplishment. The budget level requested provides for the normal increased personnel costs over the FY 1983 level, such as within-grade increases, promotions, etc., and allows for some increase in travel expenses consistent with the emphasis placed on decentralized management of program activities. The reduction of 4 FTE's reflects the reduction of the terminal isolation generic efforts in FY 1984.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Commercial Waste Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, Richland, Washington

2. Project No. 84-N-105

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $1,400
Date: 12/82

7. Financial schedule

Fiscal year	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior Year Projects	$ 3,282	$ 767	$ 400	$ 196	$ 844
FY 1981	2,000	1,015	130	195	0
FY 1982	1,100	117	385	598	0
FY 1983	1,100	0	600	500	0
FY 1984	1,400	0	0	1,111	289
		$ 1,899	$ 1,515	$ 2,600	$ 1,133

8. Brief physical description of project

These projects, at the Pacific Northwest Laboratory (PNL), provide for minor new construction and other capital alterations, additions, modifications, replacements and improvements to buildings and operating systems required annually for continuity of operation, road and street improvements, elimination of health, safety and fire hazards and support for improved and more economical operations. These projects are essential to protect and upgrade the Department's investment by preventing excessive deterioriation and obsolescence to facilities and sites which support programmatic activities. This request includes the cost of installed capital equipment which is an integral part of the general plant projects.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, Richland, Washington 2. Project No. 84-N-105

9. Purpose, justification of need for, and scope of project

General plant projects include modifications or improvements to existing buildings and other facilities, additions to buildings to house new machinery, equipment and personnel, construction of small new buildings, replacement or additions to roads and utility lines, and general area improvements. Support of general plant projects of this type is necessary to meet new and continuing needs of production, research and development programs at PNL, and to provide for safe and economical operations. The estimated level of work is based upon previous experience, program and regulatory trends, planned program changes, and anticipated developments. Examples of projects under consideration are discussed below:

Request

Autoclave Laboratory Addition, 314 Building .... $ 700

This project will provide for modifications to the Engineering Development Laboratory (314 Building) to provide new radiochemistry laboratory space for conducting radioactive material testing in autoclaves. The autoclaves to be used (10), will be relocated from another building which is about 30 miles away from the 300 area. The modification enables consolidating the radioactive autoclave tests capability and technical staff to a central and more efficient operational location. Radioactive high temperature and high pressure research tests conducted in these autoclaves are principally needed in support of the Department's radioactive waste storage program.

Miscellaneous capital work orders .... $ 700

These are minor projects of a capital nature which are necessary to maintain continuity of operation, protection of the environment, and to provide safeguards for the protection of life and property and for providing additional landlord services to support the increase in program activities being conducted at the PNL site. Such projects include building modifications; upgrading of utility systems and building services; improvements to security and operational systems; and repairs to roads and entrances at the PNL site.

10. Details of cost estimate

It is difficult to detail these types of projects in advance. Consequently, estimated costs for each at this time are preliminary in nature and primarily indicative of the size of the project. Detailed cost estimates for general plant projects are normally made with the request for direction after the project has been scoped, and the preliminary engineering completed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, Richland, Washington 2. Project No. 84-N-105

11. Method of performance

To the maximum extent practicable, work under this project will be accomplished by fixed price subcontracts.

12. Funding schedule

Not required.

13. Narrative explanation

Not required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Nuclear
Energy Supply Research and Development

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Remedial Actions (NE)				
FUSRAP				
Operating expenses ..	$ 11,245	$ 11,400	$ 11,400	$ 11,700
Capital equipment....	0	300	300	300
Subtotal	11,245	11,700	11,700	12,000
Grand Junction				
Operating Expenses ..	1,672	1,672	1,672	1,500
Subtotal	1,672	1,672	1,672	1,500
UMTRAP				
Operating Expenses...	17,200	19,788	19,788	27,125
Capital Equipment....	600	1,046	1,046	775
Subtotal	17,800	20,834	20,834	27,900
Surplus Facilities				
Operating expenses ..	11,800	12,458	12,458	15,360
Capital equipment ...	175	475	475	140
Subtotal	11,975	12,933	12,933	15,500
West Valley				
Operating expenses ..	9,772	12,400	12,400	36,000
Capital equipment ...	200	1,000	1,000	0
Construction	0	2,000	2,000	0
Subtotal	9,972	15,400	15,400	36,000
Program Direction				
Operating expenses ..	857[a]	857[a]	857	1,085
Total				
Operating expenses ..	52,546	58,575	58,575	92,770
Capital equipment ...	975	2,821	2,821	1,215
Construction	0	2,000	2,000	0
Remedial Actions ..	$ 53,521	$ 63,396	$ 63,396	$ 93,985
Staffing FTP/Total FTE's.	13/13	16/19	16/19	16/16

Authorization: Sec. 31, P.L. 83-703
P.L. 95-604 (Uranium Mill Tailings)
P.L. 92-314, P.L. 95-236 (Grand Junction)
P.L. 96-368 (West Valley)

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a/ Includes a comparability increase of $857,000 in FY 1982 and FY 1983 to reflect the transfer of Remedial Actions program direction funding previously budgeted in the Commercial Waste Management decision unit.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Remedial Actions
(Dollars in Thousands)

FY 1983 Appropriation enacted	$ 63,396
Built in Increases and Decreases	0
FY 1984 Base	63,396
Program increases and decreases:	
FUSRAP	+ 300
o Continue cleanup activities emphasizing Niagara Falls Storage Site properties.	
o Complete design engineering and NEPA efforts at four high priority sites.	
Grand Junction	- 172
o Reduce Grand Junction remedial actions consistent with the State of Colorado cost-sharing plans.	
UMTRAP	+ 7,066
o Initiate remedial actions at the Canonsburg, Salt Lake City, and Shiprock processing sites.	
o Complete NEPA efforts at all sites.	
o Conduct cleanup efforts of vicinity properties at five highest priority locations.	
Surplus Facilities	+ 2,567
o Complete stabilization and cleanup of the Niagara Falls Storage Site.	
o Initiate D&D at two high priority facilities and continue other ongoing decommissioning efforts.	
o Prepare for full-scale decommissioning of the Shippingport Atomic Power Station, which will begin in FY 1985.	
West Valley	+ 20,600
o Complete Title I design of the high-level waste solidification system.	
o Decontaminate and decommission four hot cells and complete preparatory activities for major decontamination effort in FY 1985.	
o Expand the low-level and transuranic waste handling capability.	
o Conduct other project and site activities to assure that solidification begins during FY 1991.	
Program Direction	+ 228
o Provides funding to support 16 full-time equivalent positions and program related travel expenses.	
FY 1984 Budget Request	$ 93,985

The Remedial Actions program is conducted for the Department under the Assistant Secretary for Nuclear Energy. The FY 1984 budget request for this activity is $93,985,000, an increase of $30,589,000 above the FY 1983 level. The major changes are summarized above, and explained in detail in the following narrative.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Remedial Actions	$ 63,396	$ 63,396	$ 93,985

The objective of the Remedial Actions program is to treat or stabilize radioactive wastes and perform required decontamination and decommissioning at contaminated DOE and legislatively dictated non-government facilities and sites. The general approach applied to fulfilling this objective is (a) to verify the need for remedial action by conducting radiological surveys of suspected contaminated properties; (b) to define the method of accomplishing required remedial action, based on existing radiological criteria, by developing engineering options and conducting appropriate NEPA reviews; (c) to carry out the selected remedial action; and, (d) to certify completion of the remedial action consistent with existing radiological criteria. The major activities are: (1) formerly utilized sites remedial action program (FUSRAP); (2) remedial action at Grand Junction, Colorado (P.L. 92-314, as amended); (3) uranium mill tailings remedial action program (UMTRAP) for inactive uranium mill tailings sites (P.L. 95-604); (4) management of certain radioactively contaminated Department facilities declared surplus and resulting principally from civilian nuclear energy programs; (5) demonstration of the solidification of high-level radioactive wastes at West Valley for final disposal (P.L. 96-368); and (6) program direction. Also included are other special studies and support to general nuclear-related studies, assessments and nuclear-training programs.

A. FUSRAP	$ 11,700	$ 11,700	$ 12,000
Operating expenses	$ 11,400	$ 11,400	$ 11,700

The formerly utilized site remedial action program (FUSRAP) provides for remedial actions at former nuclear processing facilities, some privately owned, which became radioactively contaminated from Manhattan Engineer District or Atomic Energy Commission activities and which have not been decontaminated sufficiently to meet current health effects guidelines for unrestricted use. Because of the potential health risks personal utilization is limited and property values are in some cases greatly reduced. To remedy the situation the contamination will be either stabilized in-place, with restrictions placed on site use or the contamination will be removed and disposed of at another location. Thirty-five sites have been identified as potentially required remedial action. Legislative authority for DOE action exists for 14 sites, and remedial actions can only be undertaken at those sites. Only minimal activity, limited to some preliminary engineering and environmental studies required for planning, will be carried out for non-authorized sites. Disposal sites for removed materials, if required, will be arranged with Federal, State and local authorities. Federally-owned sites will be used for temporary storage if possible. The Oak Ridge Operations Office has the lead field office role in implementing this program.

Specific planned activities in FY 1983 are as follows:

- Complete remedial action at Bayo Canyon, Los Alamos, New Mexico.
- Complete remedial action on the upper part of Acid Pueblo Canyon, Los Alamos, New Mexico.
- Initiate design engineering for remedial action of the radioactive material at the Shpack landfill at Norton, Massachusetts.
- Accelerate remedial action on properties in the vicinity of the Niagara Falls Storage Site (NFSS) in New York including cleanup of the West Ditch, design engineering, and cleanup of the Central Ditch.

Remedial Actions - continued

- Initiate design engineering for remedial action at the Middlesex, New Jersey, municipal landfill and for the remedial action at Linde Air Products in Tonawanda, New York; preliminary engineering for the remedial action at the DuPont Deepwater, New Jersey plant will be completed; environmental analyses and documentation will be continued for these remedial actions.

The FY 1984 program will accomplish the following:

- Complete remedial action for the central ditch adjacent to NFSS and complete preliminary engineering for other NFSS offsite properties.
- Complete design engineering and NEPA documentation at Linde Air Products in Tonawanda, New York; DuPont in Deepwater, New Jersey; and Middlesex Landfill and Middlesex Sampling Plant Phase III in Middlesex, New Jersey.
- Evaluate and prepare the necessary NEPA documents and engineering designs for stabilization of the St. Louis Airport Site (SLAPSS), Missouri, incorporating the material removed from adjacent drainage ditches and the Latty Avenue Site of the NRC in Hazelwood, Missouri.
- Carry out design engineering and NEPA review for the other high priority sites as required in response to programmatic and legislative changes.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 300	$ 300	$ 300

Capital equipment funding is required for replacement of worn out instruments and other diagnostic equipment used in the field at remedial action sites; and for the acquisition of various measurement instruments and equipment needed to obtain baseline information for disposal of the Middlesex waste. These instruments include mobile field radiological testing apparatus, radiometric and radon monitors, and digital data collection systems.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
B. Grand Junction	$ 1,672	$ 1,672	$ 1,500

Under Title II of Public Law 92-314, Congress authorized financial assistance to the State of Colorado, to limit radiation exposure resulting from the use of uranium mill tailings for construction purposes in Grand Junction, Colorado. This State/Federal cooperative effort with the State of Colorado is administered by the Colorado Department of Health through the Grand Junction Area Office. The remedial action provides for removal of uranium mill tailings from the premises of about 626 structures where radon daughter exposures exceed the Surgeon General's guidelines. Public Law 95-236 extended the time for property owners to apply for inclusion in the program which has now expired, and increased authorized program funding. Federal funds cover 75% of the program costs with the State providing the balance. FY 1985 is expected to be the last year Federal funds will be requested for the program. The Grand Junction Office administers this program. Through FY 1982, work had been undertaken at 472 structures including 400 residences, 12 schools, and 60 nonresidential structures. In FY 1983 the program will continue with radiological assessments and will initiate remedial actions at about 70 structures.

In FY 1984, the program will accomplish the following:

- Complete remedial actions on 70 structures for a total of 612 structures out of a total of 626 to be completed.

Remedial Actions - continued

- Complete effectiveness surveys, to demonstrate compliance with the Surgeon General standards, for structures remedied in FY 1982 and part of FY 1983.
- Continue evaluations on the remaining 14 structures.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
C. UMTRAP	$ 20,834	$ 20,834	$ 27,900
Operating expenses	$ 19,788	$ 19,788	$ 27,125

The uranium mill tailings remedial action (UMTRA) program is responsible for conducting remedial actions at 24 sites and several thousand vicinity properties mandated by Public Law 95-604, "The Uranium Mill Tailings Radiation Control Act of 1978." Nine of the sites are designated as high priority, six as medium priority, and nine as low priority. The act requires completion of the program within seven years of promulgation of standards by EPA, which were issued in December 1982. Work will begin on the three highest priority processing sites in early FY 1984. An evaluation is now ongoing to assess the feasibility of the mandated 7-year schedule. After completion of the evaluation, an amendment to P.L. 95-604 may be offered to extend the period of DOE's authorization to complete the project. Remedial actions will be conducted in accordance with cooperative agreements negotiated with the affected States and Indian tribes. Federal funds are to cover 90% of the remedial action costs (100% for those sites on Indian lands). The type of remedial action for the processing sites will be either to stabilize the mill tailings in-place, where feasible, or to remove the tailings to a new federally-owned disposal site. The program also includes the cleanup of properties in the vicinity of the processing sites which have become contaminated with radioactive material derived from the sites. Of the estimated several thousand vicinity properties, the majority are located in the Grand Junction area. Engineering plans and environmental documents will be prepared for the cleanup and disposal operations at each site. The concurrences of the Nuclear Regulatory Commission (NRC) and the affected State (or Tribe) are required for each site remedial action plan.

In general, the project approach for each site includes (1) development of a remedial action plan; (2) NEPA review and required concurrence on proposed action based on the remedial action plans; (3) detailed engineering; (4) remedial action; and (5) certification of the completed remedial action.

Processing Site Activity
Completed by the end of FY 1983

	High Priority	Medium Priority	Low Priority
Remedial Action Plans	4	0	0
NEPA	5	6	9
Detailed Engineering	2	0	0
Remedial Action	0	0	0

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office was established at the Albuquerque Operations Office early in FY 1980 with the mission of managing the planning, engineering and actual conduct of remedial actions for the processing sites and contaminated vicinity properties. Priority tasks in FY 1982 included: continuation or implementation of NEPA activities at all sites; initiation of detailed remedial action plans for the initial high priority sites; initiation of steps leading to acquisition of disposal sites, where appropriate; continuation of

Remedial Actions - continued

the research and development effort; continuation of vicinity property cleanup activities in Salt Lake City; and preparation of vicinity property activities at Canonsburg. In addition, the Technical Assistance Contractor, who performs the preliminary engineering and technical review of the Remedial Action Contractor, began operations. Also negotiations with the selected Remedial Action Contractor, who performs the detailed engineering and remedial actions, were initiated.

Specific accomplishments planned for FY 1983 include:

- Continue remedial actions at vicinity properties near the Canonsburg and Salt Lake City sites and initiate vicinity property work at Grand Junction.
- Complete remedial action concept papers for preliminary identification and assessment of remedial action options for all sites.
- Complete detailed remedial action plans for four high priority sites (Canonsburg, Salt Lake City, Gunnison and Shiprock) and initiate plans for two other high priority sites (Durango and Riverton) and for the first five medium priority sites (Mexican Hat, Green River, Slick Rock (2), and Lowman).
- Complete and issue Final Environmental Impact Statements for Canonsburg and Salt Lake City; initiate EIS's for Durango, Grand Junction, and Old and New Rifle; and complete and issue Environmental Assessments for all other sites.
- Complete detailed engineering designs for the first two high priority sites (Canonsburg, Salt Lake City) and initiate engineering for two additional high priority sites (Shiprock and Gunnison).
- Acquire processing and disposal sites for two high priority locations, as required.

In FY 1984, the program will initiate remedial action work on the highest priority processing sites and complete NEPA work for all sites. Specifically, the following will be accomplished:

- Initiate remedial action at the Canonsburg, Pennsylvania processing site, the Shiprock, New Mexico processing site, and at the Salt Lake City, Utah processing site.
- Complete all remaining Environmental Impact Statements (Durango, Grand Junction, and Old and New Rifle).
- Complete remedial action plans for eight sites and initiate remedial action plans for five sites.
- Complete engineering for three sites (complete the two initiated in FY 1983 and initiate and complete one more, Riverton, in FY 1984) and initiate engineering for six additional sites.
- Continue cleanup of high-priority vicinity properties at Canonsburg, Salt Lake City, Grand Junction; and initiate vicinity property remedial actions at Durango and Rifle.

Remedial Actions - continued

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 1,046	$ 1,046	$ 775

Radiological survey instrumentation, such as soil testing apparatus, radon monitors, and calibration equipment is required to support activities leading to the identification of contaminated areas and the control of tailings excavation. Measurement and data analysis equipment is necessary to support research and development efforts. Equipment is also needed to support the additional detailed planning and site engineering activities.

D. Surplus Facilities	$ 12,933	$ 12,933	$ 15,500
Operating expenses	$ 12,458	$ 12,458	$ 15,360

This program provides for the safe management and disposition of the inventory of surplus radioactively contaminated Department-owned facilities from civilian nuclear energy development programs. The decontaminated facilities and sites are returned to other productive use where appropriate. All defense-related facilities are included in the Defense Nuclear Waste Management Budget. About 100 facilities (including ore handling and processing, reactors, laboratory buildings, fuel fabrication, and nuclear rocket testing) are currently identified under this civilian activity. In addition, the program provides surveillance and maintenance of surplus facilities to assure they remain environmentally safe until cleanup can be accomplished, and develops improved methods for decontamination and decommissioning which can be transferred to industry. A long range plan will be completed in FY 1984 to establish an overall schedule and priorities for sites currently in the surplus inventory. The plan will provide for completion of decommissioning of the current inventory by 1994. Priorities are established formally through analysis of legal, economic, and health/safety factors for each site, and work plans are developed based on these priorities. The Richland Operations Office has the lead field office role in implementing the program.

Specific FY 1983 activities include:

- Nevada - complete decommissioning of surplus facilities at the Nuclear Rocket Development Station at the Nevada Test Site.

- Niagara Falls Storage Site - accelerate work with the goal of completing all interim work in early FY 1984. Specifically, complete the R-10 uranium spoils impoundment and the sealing of buildings 413 and 414 at the Niagara Falls Storage Site. Complete cleanup of the central ditch on-site and other contaminated open areas on-site. Complete remedial actions on buildings 401A, 409, 410, and 415. Initiate remedial actions on buildings 411 and 434.

- Weldon Spring - complete the engineering assessment for long-term actions at the raffinate pits and quarry; and initiate the environmental impact statement.

- Richland - complete disposal, at the Department's Richland site, of plutonium contaminated wastes from decommissioning of the Westinghouse Advanced Research and Development facility at Cheswick, Pennsylvania.

- Shippingport Atomic Power Station - complete the engineering, design and planning phases of the Decommissioning Project.

Remedial Actions - continued

- Mound Facility - continue decommissioning operations in the Plutonium Processing and Research Buildings at Mound. The operations are being carried out as part of a joint project with Defense Programs, with total project completion planned for FY 1988 at a total cost of about $64,000,000. The project will be 50 percent complete at the end of FY 1983. Planning and engineering for the Waste Transfer System will be completed and decommissioning will be initiated.

- Idaho - initiate stabilization and decontamination of the Special Power Excursion Reactor Test (SPERT) ancillary facilities at INEL, Idaho.

- Santa Susana - initiate removal of the plutonium fabrication facility in building 055 and issue the final report on the Sodium Reactor Experiment decommissioning project.

- Monticello - complete a site analysis report to characterize the site and analyze remedial action options; continue hydrologic and meteorologic monitoring.

The FY 1984 Request will complete interim actions at the high priority Niagara Falls Storage Site and make substantial progress at other high priority sites. Specifically, the following will be accomplished:

- Niagara Falls Storage Site - complete the Niagara Falls Storage Site interim stabilization and cleanup with closure of the building 411 and R-10 storage areas. Complete the NEPA review and make long term disposition decision.

- Puerto Rico - complete decommissioning of the CEER reactor facility at Mayaguez, Puerto Rico.

- Weldon Spring - begin stabilization test of pit No. 4; complete draft environmental impact statement for the pits and quarry; and begin design engineering for long-term actions at Weldon Spring, Missouri.

- Mound Facility - continue removal of Pu-contaminated glove boxes and waste transfer line at Mound Lab, Ohio, completing approximately 60 percent of the total project effort and maintaining the schedule for 1988 completion.

- Shippingport Atomic Power Station - assume responsibility for the Shippingport Atomic Power Station from DOE-Naval Reactors in late 1984. During the third quarter of FY 1984 a decommissioning contractor will be brought on board to participate with DOE-NR contractors in plant shutdown and maintenance and will complete preparations for start of the Decommissioning Project in FY 1985.

- Santa Susana - begin D&D of the Radioactive Material Development Facility (RMDF) and complete the Interim Storage Facility (ISF) at Santa Susana, California; continue removal of plutonium contaminated gloveboxes in building 055.

- Idaho - continue D&D of SPERT ancillary facilities at INEL, Idaho, initiated in FY 1983 and planned for completion in FY 1987.

- Los Alamos - initiate cleanup activities at the Los Alamos National Laboratory, involving four major facility areas over a period of 7 years. FY 1984 activities will involve D&D of Test Area-2 (TA-2) reactor ancillaries.

- Monticello - initiate NEPA process documentation and design engineering for the Monticello mill tailings pile.

Remedial Actions - continued

The FY 1984 Request also provides for authorization of the Shippingport Station Decommissioning Project in FY 1984. The Shippingport Atomic Power Station is operated by Duquesne Light Company (DLC) for the DOE-Naval Reactors program to develop the Light Water Breeder Reactor. This program will terminate and the reactor will be defueled by the end of FY 1984. Under the current contract with Duquesne, DOE is obligated to decommission and place the facility in a long-term radiologically safe condition at termination of the contract. The DOE facility is on land leased from DLC who wants the land released for other use. Authorization for the Decommissioning Project is requested in FY 1984 to provide for selection of a contractor who will prepare for full-scale decommissioning activities, which will begin in the first quarter of FY 1985. The project will dismantle and remove the DOE-owned portions of the plant consisting principally of the reactor, the heat transfer system, the fuel handling system, and the rad waste system. The reactor vessel, internals, and neutron shield tank will be removed and shipped intact to a burial site at Hanford; other wastes will be sent to Savannah River. The total project cost is estimated to be $74,750,000 and is projected to be completed in FY 1988. In late 1984, responsibility for the plant will be transferred from DOE-Naval Reactors to DOE-Waste Management. A decommissioning contractor will be acquired during FY 1984, and will participate with DOE-Naval Reactors contractors in plant shutdown and maintenance activities. The full-scale decommissioning project will start on October 1, 1984. This project is described in more detail in the Operating Expense Funded Project Data Sheet.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital Equipment	$ 475	$ 475	$ 140

The requested capital equipment funding is required to purchase test equipment and instrumentation in support of the disposition of facilities and R&D on decommissioning methods. These funds will provide equipment such as digital data collection systems, radioactive samplers, and field survey instrumentation for cleanup efforts at the various locations.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
E. West Valley Demonstration Project	$ 15,400	$ 15,400	$ 36,000
Operating Expenses	$ 12,400	$ 12,400	$ 36,000

The objective of the West Valley Demonstration Project is to demonstrate solidification for disposal of high-level nuclear wastes under the provisions of Public Law 96-368, the "West Valley Demonstration Project Act" enacted in 1980. The project will carry out an integrated production-scale development and demonstration project for treating the alkaline and acidic high-level liquid nuclear wastes at the Western New York Nuclear Service Center, near West Valley. The Center reprocessed nuclear fuel from 1966 to 1972. During that time, approximately 560,000 gallons of neutralized high-level waste (HLW) was generated by this activity and stored in an underground carbon steel tank. The neutralized waste is similar to that stored at the Department's Savannah River and Hanford sites in that these wastes also consist of a supernatant liquid and a sludge that has formed on the tank bottom. A smaller amount (about 12,000 gallons) of acidic Thorex waste, being stored in an underground stainless steel tank, will also be treated.

In accordance with the Act, the project will demonstrate the solidification and preparation of high-level radioactive waste for disposal. Major activities embodied in the project include: (1) necessary decontamination required to prepare existing facilities and equipment at the Center to accommodate the solidification project; (2) removal of the wastes from the underground storage tanks; (3) development, design, construction and operation of systems and necessary supporting facilities for the solidification of the wastes; (4) acquisition of containers for the permanent disposal of the solidified waste; (5) temporary storage and transportation of the solidified waste to an appropriate Federal repository for permanent disposal; (6) decontamination and decommissioning (D&D) of the waste tanks, facilities, hardware, and material used in carrying out the project; and (7) disposal of low-level and transuranic wastes produced from project activities.

During FY 1983, the development of definitive plans for carrying out the project will be emphasized. The conceptual design for a HLW solidification facility and evaluation and scoping of the remaining tasks will be completed. By the end of the year, a project baseline plan will have been established, including estimated costs and schedules for the duration of the project up to, but not including final project D&D. Installation of program/project management policies, plans, and procedures will be completed. A management control and performance measurement system will be put into operation. Coordination with the Nuclear Regulatory Commission and other agencies will continue to keep them informed of project plans and progress, and to consult on project-related matters. The project is also interfacing and coordinating with ongoing activities being conducted by the Commercial Waste Treatment program, as well as efforts on the Defense Waste Processing Facility funded by the Defense Programs.

The primary technical objectives during FY 1983 include: characterization of the waste supernatant and sludge; examination of sludge mobilization and removal capability; development of waste qualification criteria; prepare conceptual design of a processing system for early treatment of supernatant liquid; initiation of the efforts to specify supporting equipment such as improved liquid waste treatment capability and component test stand and mock-ups related to the HLW solidification processing facility; award of an Architect-Engineer (A/E) contract in preparation for the detailed design engineering to be performed in FY 1984; sample and survey major hot cells; decontaminate chemical crane room and cranes; restore laundry for cleaning contaminated clothing; preparatory efforts to support installation and utilization of radiological control systems (e.g., laboratory analysis, personnel protection equipment); development of procedures necessary to assure radiological worker safety; revised respiratory protection program; improved radiation monitors; an enhanced ALARA program; and institution of a volume reduction, segregation, and compaction program for low-level and for transuranic (LLW/TRU) waste.

With the planning, scoping, characterization, and baselining efforts completed in FY 1983, the FY 1984 requested funds will be used to implement major project efforts. This will include the following tasks:

(1) HLW Solidification: Major project design engineering activities will be performed in FY 1984. This will include design in the areas of HLW liquid waste transfer and solidification systems; process and product quality control; canister handling and welding; remotized operation and maintenance; and radioactive off-gas treatment systems. Design and procurement of equipment for the HLW solidification component test stand and mock-ups to support design will be performed. Title I design of the high-level waste solidification equipment and facilities will be completed, refining the design details and cost and schedule estimates.

The project A/E will be used to provide engineering, analysis, and design support for the substantial efforts to be initiated on waste pretreatment systems including sludge mobilization, supernatant handling and treatment, and low-level waste treatment. In addition, the A/E will support LLW/TRU management, decontamination, safety analyses, facility modifications and upgrades, inspection, and construction through feasibility studies engineering analyses, cost trade-offs, and design. For example, the sludge mobilization effort will require the development of equipment and methods using waste tank mock-ups and modeling to determine removal procedures and equipment given the physical, radiological, and chemical nature of the sludge. Long-lead procurement and fabrication of sludge mobilization equipment (e.g., pumps and mounts) is anticipated. Efforts related to supernatant treatment will include design completion, testing, and procurement actions for pumps, filters, piping, tanks, and associated equipment. Waste form specification and qualification procedures will be developed and coordinated with the Waste Repository program. Required safety analyses will also be prepared.

(2) Decontamination and Decommissioning: D&D of major plant hot cells will continue (i.e., extraction cells, uranium and plutonium product cells, chemical process cell, liquid waste cell, and process mechanical cell). The D&D will progress from the areas of least contamination (e.g., extraction cells) toward those that are highly contaminated, such as the Chemical Process Cell. Work will begin on major refurbishment of the hot cell cranes, crane maintenance rooms, and manipulator systems. Improved procedures, including use of corrosive decontamination solutions and associated equipment, will be introduced along with the capability to treat the low-level liquid wastes that are generated in the decontamination operations. The increased FY 1984 effort will require additional operating contractor personnel and materials and equipment to support the above activities.

(3) Operations: The efforts in this area will increase substantially as additional LLW/TRU wastes are generated by D&D operations. Expanded capability in LLW/TRU sorting, volume reduction, TRU storage, and LLW disposal will be required. The sorting and treatment capability is especially important and must be brought on line in early FY 1984 so that LLW and TRU waste packages can be prepared in conformance with storage/disposal requirements. Long lead procurement for the volume reduction equipment will be initiated and liquid waste storage tanks will be purchased. The refurbishment design of facility cells for TRU waste storage will be completed in FY 1984. This storage capacity is intimately linked with D&D because the waste storage will be required before further D&D of the hot cells can proceed.

To support the HLW solidification, decontamination and operations efforts will require increased support from safety, quality assurance, procurement/contracts, radiological surveillance, environmental monitoring, laboratory analysis, personal dosimetry, and industrial safety.

In summary, the FY 1984 West Valley program will accomplish the following:

- Complete preliminary (Title I) design of high-level waste solidification equipment and facilities.
- Provide necessary design support and verification through safety analyses, technology assessments, and mock-ups.
- Permit long-lead procurement of key equipment items for solidification.
- Provide large-scale sludge mobilization physical modeling.
- Support hot cell decontamination efforts.
- Provide refurbishment of hot cell cranes and crane repair rooms.

Remedial Actions - continued

- o Initiate procurement of LLW/TRU sorting facility.
- o Permit procurement of essential LLW volume reduction equipment including evaporator and temporary storage tanks.
- o Provide enhanced radiological and industrial safety, including laboratory analytical services and health physics coverage.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital Equipment	$ 1,000	$ 1,000	$ 0

The FY 1983 funding provided for basic upgrading and replacement required for waste solidification and safe operation and maintenance of the site, such as health physics and environmental monitoring instrumentation and equipment; quality assurance calibration and special non-destructive examination equipment; decontamination and decommissioning tools and apparatus; manipulators and hot cell lights; and analytical chemical laboratory equipment.

Funds are not requested in FY 1984, since the project will be entirely operating expense funded.

Construction	$ 2,000	$ 2,000	$ 0

The FY 1983 funds were used to complete miscellaneous small construction and improvement projects essential for conduct of the waste solidification program and for safe operation and maintenance of site facilities, such as: (1) installation of meteorological and environmental monitoring lab; (2) construction of a low-level/transuranic waste sorting facility; (3) upgrade and modification of plant systems, such as low-level waste treatment facility, laundry for contaminated clothing and resin settling tank; (4) upgrade and modification of plant facilities, such as roofs, hatches, and roads; and (5) construction of a facility to protect the component test stand. Funds are not requested in FY 1984, since the project will be entirely operating expense funded.

F. Program Direction	$ 857	$ 857	$ 1,085

The Remedial Action program direction FY 1984 budget request is $1,085,000, an increase of $228,000 above the FY 1983 budget amount. This budget provides for continuation of 16 full-time equivalents which is a decrease of 3 FTE's below the FY 1983 level. Also included in this budget is continuation of the radiological survey function transferred from the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness in FY 1983. The budget covers employee salaries, overtime, incentive awards, severance pay, benefits and the travel expenses directly related to program accomplishment. The travel expenses include both headquarters and dedicated field office personnel who support the Remedial Action program. The budget level requested provides for the normal increased personnel costs over the FY 1983 level, such as within-grade increases, promotions, etc., and allows for some increase in travel expenses consistent with the emphasis placed on decentralized management of program activities.

The 16 full-time equivalent positions at headquarters provide overall management of the Remedial Action program activities. Responsibilities include developing policy; administration-budget formulation and execution; long range planning; issuing guidance; monitoring and evaluating contractor performance; and providing the link between the Department and other agencies, the Congress, public interest constituencies, and the private sector on Remedial Action activities. These programs require extensive coordination with other federal agencies, property owners, state and local governments, and the Indian Nations.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Nuclear Energy

Energy Supply Research and Development
Remedial Actions

(Tabular dollars in thousands. Narrative material in whole dollars.)

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Estimated Cost (TEC): $74,750,000
(For Engineering, Procurement, and
Decommissioning Operations)

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Estimated Cost (TEC): $74,750,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1982 Actual			FY 1983 Estimate		FY 1984 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating Expenses: Engineering & Decommissioning								
1. Conceptual Engineering	$ 540	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
2. Engineering	1,276	2,332	2,332	2,332	2,452	2,452	0	0
3. Procurement	0	0	0	0	0	0	0	0
4. Decommissioning Operations	0	0	0	0	0	0	0	0
5. Contingency	0	0	0	0	0	0	0	0
R&D Related to Construction	0	0	0	0	0	0	0	0
Interim Site Operations	0	0	0	0	0	0	1,550	1,550
Facility Operations	0	0	0	0	0	0	0	0
Direct Project Related Support Costs	0	0	0	0	0	0	0	0
Capital Equipment	0	0	0	0	0	0	0	0
Total Operating Expenses	1,816	2,332	2,332	2,332	2,452	2,452	1,550	1,550
Other DOE Funding	0	0	0	0	0	0	0	0
Total DOE Funding	1,816	2,332	2,332	2,332	2,452	2,452	0	0
Non-DOE Funding	0	0	0	0	0	0	0	0
Total Project Funding	$ 1,816	$ 2,332	$ 2,332	$ 2,332	$ 2,452	$ 2,452	$ 1,550	$ 1,550

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Estimated Cost (TEC): $74,750,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Estimate		FY 1986 Estimate		FY 1987 Estimate		FY 1988 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating Expenses:									
Engineering & Decommissioning									
1. Conceptual Engineering	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 540
2. Engineering	0	0	0	0	0	0	0	0	6,060
3. Procurement	4,000	1,800	2,000	4,200	0	0	0	0	6,000
4. Decommissioning Operations	12,600	3,300	20,600	16,400	14,700	22,200	0	6,000	47,900
5. Contingency	3,400	900	5,400	4,400	3,900	5,800	0	1,600	12,700
R&D Related to Construction	0	0	0	0	0	0	0	0	0
Interim Site Operations	0	0	0	0	0	0	0	0	1,550
Facility Operations	0	0	0	0	0	0	0	0	0
Direct Project Related Support Costs	0	0	0	0	0	0	0	0	0
Capital Equipment	0	0	0	0	0	0	0	0	0
Total Operating Expenses	20,000	6,000	28,000	25,000	18,600	28,000	0	7,600	74,750
Other DOE Funding	0	0	0	0	0	0	0	0	0
Total DOE Funding	20,000	6,000	28,000	25,000	18,600	28,000	0	7,600	74,750
Non-DOE Funding	0	0	0	0	0	0	0	0	0
Total Project Funding	$20,000	$ 6,000	$28,000	$25,000	$18,600	$28,000	$ 0	$ 7,600	$74,750

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Estimated Cost (TEC): $74,750,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Shippingport Atomic Power Station (Shippingport Station) is located on the south bank of the Ohio River in the Borough of Shippingport, Beaver County, Pennsylvania, on part of a 486.8-acre tract of land owned by the Duquesne Light Company (DLC). The Station uses a pressurized water reactor to generate steam, and was the first nuclear plant in the United States to be used by a public utility to produce electricity. The nuclear reactor portion of Shippingport Station has been in operation since 1957 under supervision of the Department of Energy (DOE), Office of the Deputy Assistant Secretary for Naval Reactors (NR). The third and final core installed was of the light water breeder reactor (LWBR) type. The station was shutdown and permanently disconnected from the power grid on October 1, 1982, after sufficient data from the LWBR core had been obtained. At an appropriate time following station shutdown, end-of-life testing and defueling, responsibility for the Station will be transferred to the Office of Terminal Waste Disposal and Remedial Action, DOE-HQ, for decommissioning. The NEPA process has been completed and the decommissioning mode has been officially selected to be prompt removal/dismantling. All radioactive or contaminated material will be removed from the site. All government-owned structures will be removed; structures and surfaces remaining will be decontaminated sufficiently to permit release for unrestricted use.

The purpose of the Shippingport Station Decommissioning Project (SSDP) is to place the Shippingport Atomic Power Station in a long-term radiologically safe condition following defueling of the reactor (as agreed by the Government in contract #E(36-1)-292 with DLC), to perform decommissioning in such a manner as to demonstrate to the nuclear industry application of decommissioning procedures to a large nuclear power plant, and to provide useful data for future decommissioning projects. The Shippingport Station was the first large scale central station nuclear power plant in the United States and was funded jointly by a predecessor agency to DOE (Atomic Energy Commission) and the Duquesne Light Company of Pittsburgh. It is currently operated for DOE-NR by the Duquesne Light Company. Decommissioning of the Station is the final phase of this long term reactor development program. The SSDP will make the nuclear portion of the Station radiologically safe, and will remove government-owned portions of the plant including, components and equipment. Thus, the SSDP directly supports DOE's mission by demonstrating the economic and technical feasibility of decommissioning of commercial nuclear power plants. The SSDP will be accomplished with minimum environmental impact and will result in restoring the reactor site radiologically to unrestricted use. The prompt removal/dismantling mode is the most cost effective mode and results in a shorter decommissioning schedule.

(a) Schedule of Planned Activities

Activity	Start	Complete
Conceptual Engineering	2nd Qtr. FY 1979	1st Qtr. FY 1981
Engineering	1st Qtr. FY 1981	4th Qtr. FY 1983
Decommissioning	1st Qtr. FY 1985	4th Qtr. FY 1988

(b) Management and Contracting

Project management is provided by DOE-Richland Operations Office (RL). Technical, cost and schedule management for the project is provided by the Office of Surplus Facilities Management (OSFM), UNC Nuclear Industries (UNC). Burns and Roe Industrial Services Corporation (BRISC), with Nuclear Energy Services, Inc. (NES) as principal subcontractor, is under contract to RL to provide engineering services to SSDP. A decommissioning operations contractor (D.O.C.) to be selected in FY 1984 will be responsible for management and performance of physical decommissioning. Activities in FY 1984 include the maintenance and surveillance of those Station systems and facilities required to be operable when physical decommissioning commences, establishment of a DOE on-site project office, mobilization of the decommissioning operations contractor staff on-site, and training of D.O.C. staff to accept responsibility for Station safety and security and for operation of appropriate systems and facilities.

(c) Prior Year Achievements

The mission need, project objective, and initiative of project activity was approved on November 2, 1979. The final Environmental Impact Statement (EIS) was approved in May 1982, and the Department selected the prompt dismantlement mode for decommissioning in August 1982 and announced this decision in the Federal Register.

Conceptual design was completed and engineering was 73 percent complete.

(d) Current Year

Engineering will be completed. The process to select the D.O.C. will be initiated.

(e) Reasons for Increases and Decreases

This is the first year a data sheet has been submitted for this project.

(f) Cost Estimate

The costs shown include engineering, procurement, and decommissioning operations to make the nuclear portion of the Shippingport Station radiologically safe, and remove all government-owned portions of the plant including components and equipment.

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Estimated Cost (TEC): $74,750,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Item Cost	Total Cost
1. Operating Expenses: Design and Construction (Engineering and Decommissioning)	$	$ 60,500
a. Conceptual Engineering	540	
b. Engineering	6,060	
c. Procurement	6,000	
d. Decommissioning Operations	47,900	
2. Contingency @ approximately 21% of decommissioning costs		12,700
3. Maintenance and Surveillance		1,550
Total Estimated Cost		$ 74,750

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Nuclear Energy

Energy Supply Research and Development
Remedial Actions

(Tabular dollars in thousands. Narrative material in whole dollars.)

West Valley Demonstration Project West Valley, New York	Total Estimated Cost (TEC): 1/ (For operation, development, design, construction, and decontamination and decommissioning.)

1/ A total estimated cost is not available due to incomplete conceptual design (30% complete); a total cost estimate will be available upon completion of conceptual design (end of FY 1983).

West Valley Demonstration Project
West Valley, New York

Total Estimated Cost (TEC): 1/

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Yrs.	FY 1982 Actual			FY 1983 Estimate			FY 1984 Estimate		Cumulative Total	TEC 1/
	Obs.	BA	Obs.	BO	BA	Obs.	BO	BA	BO	BA	BA
Operating expense (DOE):											
Waste solidification (development, design, construction, and processing)	$ 0	$ 700	$ 700	$ 700	$ 3,000	$ 3,000	$ 3,000	$15,700	$15,200	$19,400	$19,400
Site operations	0	7,000	7,000	7,000	5,000	5,000	5,000	10,000	9,500	22,000	22,000
Decontamination and decommissioning	0	300	300	300	2,400	2,400	2,400	4,300	4,300	7,000	7,000
Direct project related support costs	500	1,522	1,563	2,073	2,000	2,000	2,300	6,000	6,000	10,022	10,022
Total operating expenses	500	9,522	9,563	10,073	12,400	12,400	12,700	36,000	35,000	58,422	58,422
Other DOE funding:											
Capital equipment	0	200	200	159	1,000	1,000	1,000	0	0	1,200	1,200
General plant projects	0	0	0	0	2,000	2,000	2,000	0	0	2,000	2,000
Total DOE funding:	500	9,722	9,763	10,232	15,400	15,400	15,700	36,000	35,000	61,622	61,622
Non-DOE funding: 2/											
Design and construction	0	96	96	96	600	600	600	1,000	1,000	1,696	1,696
Total Project Funding:	$ 500	$ 9,818	$ 9,859	$10,328	$16,000	$16,000	$16,300	$37,000	$36,000	$63,318	$63,318

1/ A total estimated cost is not available due to incomplete conceptual design (30% complete) and does not include pre-project planning costs. The balance of the funding required to complete this project will be requested in future years.

2/ Represents the Design and Construction tasks funded by the New York State Energy Research and Development Authority (NYSERDA). Other NYSERDA contributions include value of Western New York Nuclear Service Center and NYSERDA services. Total NYSERDA contribution will be 10 percent of amount shown on Total Project Funding line.

West Valley Demonstration Project
West Valley, New York

Total Estimated Cost (TEC): 1/

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

Public Law 96-368, West Valley Demonstration Project Act, authorized the Department of Energy to carry out a high-level liquid nuclear waste demonstration project at the Western New York Nuclear Service Center near West Valley, New York, for the purpose of demonstrating the solidification and preparation of high-level radioactive waste for disposal. By virtue of demonstrating the solidification of liquid high-level wastes, the potential hazards associated with continued storage of the liquid waste at the Center will be diminished.

The project will solidify, in a form suitable for transportation and permanent disposal, the high-level radioactive waste at the Center by vitrification or by such other technology which the Deparment determines to be the most effective for solidification. The project scope includes all activities undertaken in carrying out the solidification, including: (1) processing and immobilization of the liquid high-level wastes; (2) preparation of the Center's premises and facilities to accommodate the solidification processing, including such decontamination of existing facilities and equipment as may be necessary or appropriate; (3) develop and provide containers suitable for the permanent disposal of the wastes solidified at the Center; (4) transportation, as soon as feasible after solidification, of the wastes solidified at the Center to an appropriate Federal repository for permanent disposal; (5) decontamination and decommissioning of the tanks, and other facilities at the Center in which the solidified wastes were stored and other facilities, material, and hardware used in carrying out the solidification of the wastes; and (6) disposal of low-level and transuranic wastes generated from project activities.

Since existing facilities and utilities will be used to support this project, site improvements and utility (water, electrical and sewer) upgrading will be minimal. Utilization of existing facilities will be maximized and new construction kept to a minimum consistent with programmatic and environmental, health and safety needs. A limited amount of new facilities and modifications and/or additions to existing facilities are included to accommodate installation and operation of the solidification equipment, and to provide necessary office space and support for these activities.

Operating expense funds will be used to fund research and development, design, construction, site/facility operation, and decontamination and decommissioning of facilities, material, and hardware used in connection with the project.

1/ A total estimated cost is not available due to incomplete conceptual design (30% complete).

West Valley Demonstration Project
West Valley, New York

Total Estimated Cost (TEC): 1/

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities 2/

Activity	Start	Complete
Design, procurement and fabrication	3rd Qtr. FY 1982	2nd Qtr. FY 1990
Facility construction	4th Qtr. FY 1983	2nd Qtr. FY 1990
Final decontamination and decommissioning	4th Qtr. FY 1988	Open
Facility startup and cold operation	2nd Qtr. FY 1990	2nd Qtr. FY 1991
Solidification of high-level wastes	2nd Qtr. FY 1991	4th Qtr. FY 1993

(b) Management and Contracting

The project will be managed for the Department by an on-site project office, reporting through the Idaho Operations Office, which is responsible for the day-to-day management and decisionmaking. An operating contractor (West Valley Nuclear Services Company, Inc., a subsidiary of Westinghouse Electric Corporation, was selected in August 1981) will be responsible for the technical management of the high-level waste solidification related activities, site and facility operations, and decontamination and decommissioning. The Department's Project Office and Headquarters approval will be required on matters affecting project policies and technical, cost, and schedule baselines. The State of New York through the New York State Energy Research and Development Authority provides consultation and comment on project activities to the Department as required by the West Valley Demonstration Project Act and the cooperative agreement between the Department and the Authority. To the extent feasible, design, procurement, construction and inspection will be by fixed-price contractor and subcontractors awarded on the basis of competitive bids. However, due to the complexity of the work, it may be necessary to utilize cost plus fixed fee contracts for portions of the work. Award fee contracts will be used when justified. Contracting will be by the Department or the operating contractor, depending on the nature and scope of work.

1/ A total estimated cost is not available due to incomplete conceptual design (30% complete).

2/ Estimated start and completion dates are based on latest available information. A baseline project schedule will be available upon completion of the conceptual design (end of FY 1983). Based on preliminary information, solidification is anticipated to take three years beginning in the late 1980's followed by completion of decontamination and decommissioning activities in the mid 1990's.

(c) Prior Year Achievements (FY 1982)

The Department assumed responsibility for site operation on February 25, 1982. Facility restoration and upgrading began in March 1982. Conceptual design of the waste solidification facilities and decontamination of critical facility areas and hot cells for project reuse was initiated in June 1982. The Final Environmental Impact Statement was issued in July 1982 followed by a Record of Decision in August. A borosilicate glass canister using a 90% scale liquid fed ceramic melter with simulated, non-radioactive West Valley waste was produced in August 1982. Samples of the neutralized waste were obtained in August 1982 to assist in design of waste removal and solidification equipment. Initial staffing of Department and operating contractor offices (e.g., facility operations; engineering; project management and control; environmental, health and safety; quality assurance; and decontamination) was completed.

(d) Current Year (FY 1983)

Conceptual design of the solidification process and selection of an architect-engineering firm for performance of preliminary design (Title I) will be completed. Decontamination planning and operations will continue. Development of a program for removing the waste (particularly the sludge which has formed in the bottom of the tank containing the neutralized liquid waste) is planned, and may include construction of models to verify removal techniques and for operator training. Waste solidification development program will focus on verification of applicable technology with emphasis on the following areas: waste characterization, waste form characteristics and behavior, sludge-supernate separation and pretreatment, sodium removal, and residual salt cake handling. Program/project management systems necessary for carrying out the project will be in place; including policies, plans, procedures, and earned-value performance measurement system.

(e) Reasons for Increases and Decreases

FY 1984 is the first year a data sheet has been submitted for this project.

(f) Cost Estimate

The costs shown are based on planned expenditures through FY 1984. A definitive cost and schedule estimate is not available and is being prepared as part of the conceptual design effort. A cost estimate through waste solidification, but not including final decontamination and decommissioning (D&D), is being prepared during FY 1983. The cost estimate includes all costs associated with the West Valley project: R&D, design, construction, waste immobilization, decontamination and decommissioning of existing hot cells for project reuse,

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1/ A total estimated cost is not available due to incomplete conceptual design (30% complete).

(f) Cost Estimate (continued)

site/facility operation and maintenance, and project management. The cost estimate will be updated to include final D&D when sufficient information is available to perform the analysis.

	Total Cost 2/
High-Level Waste Solidification	$ 19,400
Site Operations	22,000
Decontamination and Decommissioning	7,000
Direct Project Related Support	10,022
Capital Equipment	1,200
General Plant Projects	2,000
Total DOE Cost	61,622
Non-DOE Costs	1,696
Total Estimated Cost	$ 63,318

High-Level Waste Solidification

This category provides for development, design, construction, and processing activities related to immobilization and preparation of the high-level waste for permanent disposal.

(1) Development - includes confirmatory or prototypic development program, including component test stand and mockups.

(2) Design - includes conceptual, preliminary and final design, inspection services, system(s) acceptance testing, and facility startup.

(3) Buildings and structures - includes modification and construction of facilities for waste solidification and supporting systems/ activities, field offices, and storage sheds.

(4) Special equipment - includes waste removal, transfer and solidification systems, auxiliary systems (e.g., radioactive off-gas treatment system), and canisters necessary to carry out the waste immobilization program.

(5) Processing - includes labor and material costs for immobilizing the high-level waste.

1/ A total estimated cost is not available due to incomplete conceptual design (30% complete).
2/ Thru FY 1984 only.

(f) Cost Estimate (continued)

Site Operations

Operations include site/facility operations, maintenance, restoration and upgrade necessary to support waste solidification, decontamination and decommissioning, environmental and occupational safety, and security and safeguards requirements.

Decontamination and Decommissioning

This category covers the planning, engineering, equipment and operations necessary for project decontamination and decommissioning (D&D). It also provides for both initial decontamination to prepare contaminated areas and hot cells for reuse by the project and final D&D of storage tanks, facilities, hardware, and materials used in connection with the solidification project.

Direct Project Related Support

This category provides for technical, administrative, and overall management control of the project. Activities performed support other project elements and include items such as environmental impact statements and other environmental documentation, safety analyses, public communication program, cost/schedule control systems, training, project reports, quality assurance program, and records management.

Capital Equipment

This category provides equipment used in initial site takeover operations and restoration activities, such as health physics and environmental monitoring instrumentation and equipment, decontamination and decommissioning tools and equipment, manipulators and hot cell lights, and analytical chemical laboratory equipment.

General Plant Projects

This category provides for miscellaneous small construction and improvement projects, such as installation of a meteorological and environmental monitoring laboratory, construction of a low-level/transuranic waste sorting facility, construction of a facility to protect the component test stand, and upgrade of the low-level waste treatment facility and laundry.

1/ A total estimated cost is not available due to incomplete conceptual design (30% complete).

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Nuclear Fuel Cycle				
Fuel Reprocessing R&D				
Operating expenses ...	$ 34,165 1/	$ 31,809	$ 31,809	$ 31,385
Capital equipment	3,420	3,600	3,600	4,000
Subtotal	37,585	35,409 2/	35,409	35,385
Spent Fuel Technology				
Operating expenses ...	5,822	5,421	5,421	4,500
Capital equipment	1,000	968	968	500
Subtotal	6,822	6,389	6,389	5,000
Program Direction	1,065	853	853	1,422
Total				
Operating expenses	41,052	38,083	38,083	37,307
Capital equipment	4,420	4,568	4,568	4,500
Nuclear Fuel Cycle ...	$ 45,472	$ 42,651	$ 42,651	$ 41,807
Staffing FTP/Total FTE's	19/19	21/21	21/21	21/21

Authorization: Sec. 31, PL 83-703; Sec. 218, PL 97-425

1/ In FY 1982, $23,400,000 for Fuel Cycle R&D was appropriated under the Breeder Reactor Systems decision unit; $7,500,000 for Barnwell Nuclear Fuel Plant, $2,600,000 for LWR Fuel Cycle and $3,000,000 for Thorium Fuel Cycle was appropriated under the Converter Reactor Systems decision unit; and $1,085,000 for airborne waste was appropriated under the Commercial Nuclear Waste decision unit.

2/ Includes $300,000 for Airborne Waste which was included under the Commercial Nuclear Waste decision unit FY 1983 Budget request.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Summary of Changes
Nuclear Fuel Cycle
(Dollars in thousands)

FY 1984 Base		$ 42,651
o Phase down of spent fuel program	$- 1,389	
o Increase Program Direction	+ 569	
o Deletes funding for Barnwell	- 7,500	
o Full operation of IET facility	+ 9,986	
o Deletes funding for Thorium Fuel Cycle	- 2,510	
FY 1984 Request		$ 41,807

	FY 1983 Appropriation	FY 1984 Request
Nuclear Fuel Cycle	$ 42,651	$ 41,807

The Nuclear Fuel Cycle Program activities focus on development of the Liquid Metal Fast Breeder Reactor (LMFBR) fuel cycle and development of storage technologies and a reprocessing capability for the Light Water Reactor (LWR) fuel cycle. Also associated with these efforts is the resolution of technical, regulatory, and institutional uncertainties that currently serve as barriers to commercial reprocessing.

	FY 1983 Appropriation	FY 1984 Request
Fuel Reprocessing R&D	$ 35,409	$ 35,385
Operating Expenses	$ 31,809	$ 31,385

This activity provides for development and demonstration of advanced technology for reprocessing of irradiated fuels from nuclear power reactors. Primary emphasis of the development and demonstration effort is on the more stringent requirements associated with reprocessing of Fast Breeder Reactor (FBR) fuels, including the higher thermal and radiation burdens, higher fissile content, sodium contamination, and heavier fuel assembly structures. Advanced developments for FBR fuel reprocessing will be available for use by future LWR fuel reprocessors. The technical program will focus on development and demonstration of reprocessing technology that will provide for reduced radiation exposure to workers, increased environmental protection, increased reliability, enhanced safeguards, and reduced costs.

This program is comprised of two subactivities: Advanced Fuel Reprocessing and Proof-of-Breeding.

	FY 1983 Appropriation	FY 1984 Request
1. Advanced Fuel Reprocessing	$ 19,656	$ 28,385

Development of remotely operable and maintainable reprocessing equipment and systems will continue, leading to integrated cold testing in the Integrated Equipment Test (IET) Facility beginning in FY 1985. Laboratory and hot cell experiments will continue at a reduced level on fuel dissolution, feed clarification, and solvent extraction to develop needed data on solids behavior, fissile and fertile materials recovery, and fission product decontamination. Support efforts in instrumentation and controls, analytical chemistry, environmental protection, radiation protection, safety, and safeguards will continue.

Design studies of an advanced engineering scale breeder fuel reprocessing facility (the Hot Experimental Facility (HEF)) have shown that a totally remotely operated and maintained reprocessing plant incorporating full flexibility for alternative fuels (i.e., uranium-233/thorium) would be very expensive. Recently initiated conceptual design studies will continue to examine alternate means of developing and demonstrating the necessary reprocessing technology that would cost considerably less than in the HEF.

The FY 1984 request will include the following:

- Full operation of the IET facility including installation and testing of equipment components, instrumentation, and remote manipulators to provide operating and performance experience and design data. Head end operations will involve the disassembly, shearing and dissolution of dummy fuel.
- Direct engineering support to IET for acceptance testing and installation of equipment, components, instruments, and remote systems.

- Continue operation of the SETF and continue associated engineering support.
- Prepare gel-sphere feed and continue development efforts to qualify this material for Breeder Fuel at Oak Ridge National Laboratory, Pacific Northwest Laboratory, and Hanford Engineering Development Laboratory (HEDL) in the plutonium conversion activity.
- Conduct Airborne Waste Management efforts.
- Provide for international exchanges and cooperative programs for FBR reprocessing.

	FY 1983 Appropriation	FY 1984 Request
2. Proof-of-Breeding	$ 2,000	$ 3,000

The proof-of-breeding analytical effort will continue to support the Light Water Breeder Reactor (LWBR) breeding demonstration in the Shippingport reactor. Planning at Argonne National Laboratory (ANL) is based on first receipt of irradiated fuel in early 1984 when 16 fuel rods will be dissolved and precisely analyzed to determine breeding. Planning by ANL for the eventual treatment of the waste and cleanout and decontamination of their facilities in this project will also be initiated. The FY 1984 request provides for analytical support at ANL for LWBR Proof-of-Breeding program; analysis will be completed 11/84, the project will be completed 7/86.

3. Barnwell	$ 7,500	$ 0

There are no FY 1984 funds requested for Barnwell.

4. Thorium Fuel Cycle	$ 2,653	$ 0

There are no FY 1984 funds requested for Thorium Fuel Cycle.

Capital Equipment	$ 3,600	$ 4,000

This request supports specialized and miscellaneous equipment and instrumentation requirements for research, development, engineering, and technical studies associated with the nuclear fuel reprocessing program. Equipment is required to facilitate the engineering development of advanced, remote equipment components such as process controllers, nondestructive assay equipment, a cladding hull melter, feed clarification system, process tanks and equipment, and advanced remote maintenance systems.

Spent Fuel Technology	$ 6,389	$ 5,000
Operating Expenses	$ 5,421	$ 4,500

DOE will participate with utilities and industry in the testing of new storage technologies (dry storage casks in particular) to evaluate their safety and feasibility and to provide a data base for NRC licensing requests. The development and application of these technologies are needed to allow utilities or other private sector interests to provide safe, timely, and cost effective solutions to the impending need for additional LWR interim spent fuel storage capacity. These tests and demonstrations will be arranged based on specific utility/industry test proposals considered to have substantial merit. These activities should bound the economic effectiveness and performance uncertainties of new technologies, provide experience of direct benefit, and allow evaluations of the appropriate role of new storage technologies in overall interim storage systems.

Additional activities will include continued investigation of the integrity and failure modes of fuel under dry storage conditions and the collection/dissemination of information such as utility storage requirements.

	FY 1983 Appropriation	FY 1984 Request
Capital Equipment	$ 968	$ 500

Provides for equipment for cooperative testing demonstrations and fuel integrity activities.

Program Direction	$ 853	$ 1,422

A total FY 1984 request of $1,422,000 is requested to provide for a continuance of 21 FTE in support of the Nuclear Fuel Cycle program.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Advanced nuclear systems (NE)				
Space and special applications				
Operating expenses	$ 33,551	$ 35,198	$ 35,198	$ 30,135
Capital equipment	2,846	2,764	2,764	2,600
Subtotal	36,397	37,962	37,962	32,735
Program direction				
Operating	1,177A/	981	981	1,370
Subtotal	1,177	981	981	1,370
Total				
Operating expenses	34,728	36,179	36,179	31,505
Capital equipment	2,846	2,764	2,764	2,600
Advanced nuclear systems	$ 37,574	$ 38,943*	$ 38,943	$ 34,105
Staffing FTP/Total FTE's	19/20	20/21	20/21	18/19

Authorization: Section 31, P.L. 83-703

A/ Reflects comparability adjustment of $-22,600 contained in the NE program support decision unit for FY 1982 and FY 1983.

*Includes $3,520,000 for space reactor development which is subject to review by the Secretary before release.

SUMMARY OF CHANGES

Nuclear Energy
Advanced Nuclear Systems
(dollars in thousands)

FY 1983 Budget Estimate	$ 38,943
Built in increases and decreases	0
FY 1984 Base	$ 38,943
Program increases and decreases:	
Flight systems development	
o Restore technology efforts under advanced modular isotope thermoelectric generator program (MITG)	+ 2,300
o Reduce effort on selected space reactor contracts	- 1,020
o Planned decrease in RTG fabrication and assembly for Galileo/ISPM	- 3,815
Flight systems support	
o Decrease in fuel fabrication, technical support, and safety effort	- 3,692
Special applications	
o Initiate efforts on advanced generator components for increased service usage	+ 1,000
Program Direction	
o Escalation in personnel costs	+ 389
FY 1984 Budget Request	$ 34,105

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Advanced nuclear systems	$ 38,943*	$ 38,943	$ 34,105

The Advanced nuclear systems program is conducted under the Assistant Secretary for Nuclear Energy. The FY 1984 budget authority request is $34,105,000, a $4,838,000 decrease from FY 1983 budget appropriation.

This budget document describes the Advanced nuclear systems funding request for FY 1984:

Space & special applications	$ 37,962	$ 37,962	$ 32,735

The Space and Special Applications program is responsible for the development and delivery of nuclear power sources for U.S. military and civilian space and terrestrial missions and for the assessment and maintenance of these nuclear energy sources consistent with the agency's health and safety requirements. In fiscal year 1984, a major activity will be to continue the development of the isotope power sources on a revised schedule for the NASA Galileo spacecraft planned for launch in 1986 and the NASA/European Space Agency (ESA) Solar polar spacecraft also planned for launch in 1986. Another major activity will be the continuation of the space nuclear reactor power program in coordination with NASA and DOD. It is also planned to continue technology activities under the Advanced modular isotope thermoelectric generator program (MITG) into a ground demonstration phase.

Operating expenses	$ 35,198	$ 35,198	$ 30,135

This program consists of three subprograms as discussed below:

Flight systems development	$ 16,020	$ 16,020	$ 13,635

This subprogram includes the design, development, fabrication, assembly, and test of isotopic space power systems on a revised schedule for the NASA Galileo and International Solar Polar Spacecraft.

Also included is the development of a space nuclear reactor power source capable of producing electricity in the 100 Kw(e) power range or above. Space reactor power systems in this power range will be needed for potential DOD applications in communications and surveillance or other national defense missions and for NASA applications involving planetary exploration.

A third major activity is a technology program aimed at demonstrating a new, light weight, radioisotope thermoelectric generator (RTG) design that takes advantage of improved thermoelectric materials, new fabrication techniques, and new design concepts (MITG).

In fiscal year 1984, the following specific activities are planned.

- Support the flight acceptance and environmental testing of the general purpose heat source/radioisotope thermoelectric generator at the Mound Facility, Miamisburg, Ohio, in support of both the NASA Galileo and International solar polar missions (ISPM).
- Deliver two thermoelectric flight converters for Galileo and ISPM spacecraft to Mound Facility.
- Complete and publish the Final safety analysis report for Galileo RTG program.
- Complete and publish the Updated safety analysis report for ISPM RTG program.

- o Complete the preliminary heat pipe design for the SP-100 space nuclear reactor (Los Alamos National Laboratory).
- o Issue draft Flight Safety Analysis Report (FSAR) for the SP-100 program.
- o Conduct analyses, tests, and related technology for reactor concepts under the space reactor program.
- o Complete the design, fabrication and assembly of one ground demonstration unit for the advanced modular isotope thermoelectric program (MITG), plus initiate the design and fabrication of a second unit.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Flight systems support	$ 19,178	$ 19,178	$ 15,500

This subprogram covers fabrication of plutonium fuel necessary for flight spacecraft missions as well as for the safety and environmental efforts. It also includes basic space nuclear power system technology development and support of the flight system program.

In fiscal year 1984, the following activities are planned:

- o Support fuel form production and encapsulation operations (Savannah River Plant).
- o Conduct heat source assembly, fueling and flight acceptance testing of a Galileo and an ISPM radioisotope thermoelectric generator (Mound Facility).
- o Conduct independent safety analyses and safety testing (Los Alamos National Laboratory).
- o Conduct independent quality assurance and quality control efforts plus independent technical support activities.

Special applications	$ 0	$ 0	$ 1,000

This subprogram covers design and integration studies, development tests on advanced RTG components aimed at extending power system lifetimes and minimizing personnel exposure operations, and analyses of compact nuclear reactor powerplants at the request of DOD. These efforts are being conducted for application at various DOD facilities. In addition, general nuclear related studies, assessments and nuclear training programs are also supported.

In FY 1984, the following activities are planned:

- o Support system application studies of terrestrial RTG users by conducting power system trade-offs, integration studies, and performance analyses.
- o Evaluate the potential of existing space system RTG technology and designs for applicability to terrestrial uses.
- o Develop RTG design concepts for terrestrial applications, considering modularity for various power levels and the potential environments.
- o Evaluate modifications or changes to existing thermoelectric material and converter designs to increase reliability, lifetime, voltage requirements for particular applications, and efficiency.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment expenses	$ 2,764	$ 2,764	$ 2,600

In fiscal year 1984, the fuel form production, encapsulation, assembly, test, and safety environmental activities will require capital equipment to maintain the program on schedule. Major equipment items include an iridium welder, back-up assembly fixtures, process equipment, glove box liners, hot cell replacement water gel windows, recorders, radiator detection and special testing hardware. The Mound Facility will require replacement RTG assembly and test equipment in support of the assembly of the heat sources and installation into the converters in order to meet the final assembly and testing dates for FY 1984. The Mound Facility will also require an upgraded iridium welder to continue production of iridium clad vent sets. Equipment required in support of the plutonium fuel form production operations at the Savannah River Plant are furnace racks, replacement process instrumentation and manipulators, and replacement water gel windows. The Los Alamos National Laboratory will require special test and analysis equipment to complete the major elements of the safety test program for the Galileo mission. The advanced modular generator development efforts will require a vacuum station for the sixth modular converter assembly. Radiation monitors, gas analyzers, temperature recorders, and replacement welding equipment will also be required in support of mission requirements.

Program direction (operating)	$ 981	$ 981	$ 1,370

At this level, the full time equivalents required to manage the advanced nuclear systems in FY 1984 total 19. This consists of 18 full time personnel and 1 other than full time personnel. The expertise required includes administrative and technical talent. These personnel must:

- Perform all necessary functions, such as contractual support, budgeting, planning and government personnel administration.
- Manage the Space and special applications programs which contain the full range of technology development, engineering, operations and safety evaluation of radioisotope and reactor-powered systems, primarily for production of electrical power in remote or hostile environments. This activity occupies a unique position in that no other organization in the U.S. supplies qualified nuclear systems for space and terrestrial specialized applications.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
LEAD TABLE

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Breeder reactor systems (NE)				
Liquid metal fast breeder reactor				
Operating expenses	$497,122[A]	$451,221[F]	$451,221[F]	$525,625
Capital equipment	21,374[B]	20,608	20,608	19,100
Construction	62,068[B]	25,000	25,000	12,100
Subtotal	580,564	496,829	496,829	556,825
Water cooled breeder				
Operating expenses	50,500	44,784	44,784	35,500
Capital equipment	1,000	200	200	0
Subtotal	51,500	44,984	44,984	35,500
Program direction				
Operating expenses	9,588[C]	8,061	8,061	10,200
Subtotal	9,588	8,061	8,061	10,200
Total				
Operating expenses	557,210	504,066	504,066	571,325
Capital equipment	22,374	20,808	20,808	19,100
Construction	62,068	25,000	25,000	12,100
Breeder reactor systems	$641,652	$549,874[G]	$549,874[G]	$602,525
Staffing FTP/Total FTE's	143/147[D][E]	194/204[H]	194/204[H]	161/171

Authorization: Section 31, P.L. 83-703
Section 309(a), P.L. 95-91

[A] Reflects a comparability adustment of $-3,300,000 to Nuclear Materials Production for Pu Oxide Preparation.

[B] Reflects a comparability adjustment of $-4,462,000 to Defense Waste and Byproducts Management for INEL Landlord.

[C] Reflects comparability adjustments of $+691,000 from AIST, $-574,000 to Fuel Cycle R&D, and $-403,000 for NE policy and management decision unit.

[D] Reflects a comparability adjustment of -159/-165 for FTP/FTE's to Defense Waste and Byproducts Management. Also, consistent with the FY 1984 structure, an adjustment of 13 FTP/FTE's from Converter to Breeder should have been made.

[E] Presenting the staffing totals in terms of FTP/FTE does not recognize late hirings in FY 1982 which are continuing in FY 1983.

[F] Reflects a comparability adjustment of $-3,700,000 to Nuclear Materials Production for Pu Oxide Preparation.

[G] Reflects a comparability adjustment of $-24,599,000 to Fuel Cycle R&D.

[H] Reflects a comparability adjustment of -62/-66 for FTP/FTE's to Defense Waste and Byproducts Management. Also, data includes 14/14 FTP/FTE's which should have been transferred to Commercial Waste from Breeder to reflect true comparability in the FY 1984 structure.

SUMMARY OF CHANGES

Nuclear Energy
Breeder Reactor Systems
(dollars in thousands)

FY 1983 appropriation	$549,874
Built in increases and decreases	0
FY 1984 Base	$549,874
Program increases and decreases:	
Liquid metal fast breeder reactor	
Clinch river breeder reactor plant	
o Conduct design, hardware fabrication and construction activities	+ 76,103
Base program	
o Increase design and procurement for SAF line equipment	+ 3,500
o Capital equipment requirements increase	+ 992
o Planned reduction in TREAT construction project	- 7,900
o Reduce Breeder Technology R&D efforts	- 5,966
o Increase GPP efforts	+ 1,000
o Increase reactor mods	+ 100
o Continue safeguards construction project	+ 600
o Reduce operation of test facilities	- 1,733
o Planned reduction in the FMEF construction project	- 6,700
Water cooled breeder	
o Reduction in the core evaluation effort	- 9,484
Program direction	
o Reflects offset of using FY 1982 unobligated carryover	+ 2,139
FY 1984 budget request	$602,525

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Breeder reactor systems	$549,874	$549,874	$602,525

The Breeder Reactor Systems program is conducted under the direction of the Assistant Secretary for Nuclear Energy. The FY 1984 budget request is $602,525,000, which is an increase of $52,651,000 over the FY 1983 Appropriation.

Liquid metal fast breeder reactor (LMFBR)	$496,829	$496,829	$556,825

The Federal Government has recognized that assuring adequate supplies of economical electricity is strategically important to the United States and many traditional means for producing electrical energy cannot be counted on to meet the growing need for electricity. Remaining sites for large hydropower plants are severely limited. Oil and natural gas, attractive as peaking power options, are generally not regarded as economic fuels for major new baseload electric power stations.

Other potential sources for producing electricity--fusion, solar photovoltaics, wind, biomass, geothermal--are being developed, but at this point do not offer a high confidence in their ability to generate large amounts of economical electricity. Each suffers from at least one of three basic limitations: 1) the technology for large-scale electric power is not developed; 2) the technology does not appear to be economically competitive; and 3) the resource may be promising in individual regions of the country, but has a limited national capability.

The United States is left, then, with only two energy sources for its large-scale electric power expansion: coal and nuclear energy. Because uranium is a limited resource, nuclear power cannot be considered a long-term contributor to our electricity supply without the breeder reactor. Since the breeder utilizes the large fraction of uranium that cannot be used in current generation light water reactors, it ensures that nuclear power will be an economic source of electricity for thousands of years, independent of the price and supply of uranium. The breeder provides a large degree of insurance against any future shortages of economic electric capacity.

The goal of the United States LMFBR program is to industrialize the breeder.

The LMFBR is under development to provide virtually inexhaustible supplies of electrical energy for the long term and to provide additional confidence to conventional nuclear deployment in the near term. The LMFBR program consists of a streamlined research and development effort focussing on those actions needed to enable private sector financing of industrial deployment including plant demonstration and technology efforts in reactor fuels, components, physics, and safety.

Operating experience with breeder reactors in the United States and abroad leaves no doubt as to their feasibility. What remains is the development of the requisite technology to enable commercial deployment by the private sector at what is accepted as the reasonable degree of risk. In essence, the LMFBR is a complex undertaking requiring years of intensive work. This size of the undertaking is beyond the investment and time horizon of any domestic business venture.

The Federal role in breeder reactors is to conduct the necessary research, development and demonstration so that the potential economic, environmental, and safety benefits of the breeder can be captured by private industry at a risk level that is consistent with normal business practices and to provide a positive policy climate for the establishment of the necessary institutional and regulatory framework for the development and deployment of commercial size breeder plants by the private sector. The ultimate responsibility for commercialization will rest with private industry.

Uncertainties in electrical demand growth, resource endowment, uranium and LWR plant costs, and other planning assumptions preclude reliable prediction of a breeder commercialization date. However, the basis for further development already exists. For example, economic benefits are derived from low estimated fuel costs especially due to the fact that enrichment would not be required. Breeder fuel is available in the form of enrichment plant tails which are already stockpiled and represents an inventory capable of sustaining breeders for centuries; thus fuel cycle costs would be relatively insensitive to supply disruptions like those experienced with imported oil during the last decade. Also, the breeder has safety and environmental attributes that makes it particularly attractive for the production of electric power. One of the most significant benefits is that reactor cooling does not depend on maintaining high system pressure. On the other hand, use of plutonium as a fuel imposes a special responsibility to develop safeguards against loss or diversion as an integral part of the overall breeder development and deployment process.

Environmental benefits include the elimination of mining, milling and enrichment requirements for LWR's and reduced emissions into the atmosphere that are typical of fossil fired generating stations. High level waste volumes from LWR would be reduced by recovering the uranium and plutonium in LWR spent fuel by reprocessing, and enrichment or mill tailings disposal would not be required. To capture these environmental and waste management benefits requires that DOE, in the Fuel Cycle program, develop processes to neutralize and avoid the acknowledged potential environmental impact of reprocessing plant operation as an integral part of reprocessing technology development.

Current designs coupled with creative financing concepts suggest that the next LMFBR could be commercially competitive with alternatives. However, such an achievement requires the continuation of breeder development. This necessitates that the program progress in a deliberate, well planned manner. The consequence of early development is lower consumer costs as compared to the consequence of late development which is an escalation of electricity prices because of finite resource economics and attendant economic penalties. Furthermore, significant program delays would destroy the continuity that is essential to the integrity of any high technology development program.

This budget supports the President's economic recovery program. Therefore, in mid FY 1982, the Agency began to consolidate and to phase down certain aspects of the program. This consolidation and orderly phase down requires that the resources provided in FY 1983 can be used in the most technically productive and cost effective manner.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Clinch river breeder reactor plant project	$193,922[1]	$193,922[1]	$270,025
Operating expenses	$187,922	$187,922	$270,025

The overall objective of the CRBRP project is to design, construct, and test the nation's first intermediate scale (375 megawatt electric) LMFBR powerplant and operate the plant as part of a utility system. The CRBRP will provide important information regarding the safety, environmental acceptability, and economic potential of LMFBR's as an essentially inexhaustible, domestic energy source.

The CRBRP project is presently authorized under Public Law 91-273, as amended. Under the subject law, Congress authorized the Agency to enter into a definitive cooperative arrangement for an LMFBR plant. The subject cooperative arrangement, called the quadripartite contract, amongst the Agency, Project Management Corporation (PMC), Tennessee Valley Authority (TVA), and Commonwealth Edison (CE) has been in effect since 1973.

[1] Actual funding to be determined in accordance with FY 1983 Continuing Resolution.

The Agency's role in the CRBRP project consists of overall project management and financial support. The utilities provide management and technical assistance, and financial support to the CRBRP project. Commonwealth Edison of Chicago and TVA are the principal utilities that provide management and technical assistance through their participation in the activities of the PMC, a nonprofit group formed especially to represent the interests of the utility industry in the day-to-day management of the project. A second nonprofit group, the Breeder Reactor Corporation (BRC), provides senior counsel on behalf of the utility industry and keeps the public and the electric power industry informed on project matters. BRC is composed of 753 electric systems from the public, private, municipal, and cooperative sectors of the electric power industry that support the project and have pledged contributions to the project.

Under the agreements already executed, non-federal contributions to the project are approximately $350,000,000 which includes $261,000,000 in utility contributions plus estimated interest earnings on the contributions of approximately $79,000,000 as well as approximately $10,000,000 in reactor manufacturers and equipment vendors contributions to the project.

Consistent with the Conference Report accompanying the FY 1983 Joint Resolution that became Public Law 97-377, the utility industry has established a task force that includes representatives from the utility industry and Government to explore proposals that could lead to greater industry cost-sharing in the project. Initial results of the task force will be forwarded to the Authorizing and Appropriating Committees responsible for the CRBRP by March 15, 1983.

Project design, hardware, and licensing activities are now well advanced and site preparation activities are underway. By the end of FY 1983, about $1,600,000,000 will have been spent on these activities ($1,450,000,000 in Government funds and $150,000,000 in utility and other contributions). The project is now at a stage where the net remaining cost to the Government to complete the project and receive substantial research and development benefits as well as significantly advance the Nation's ability to commercialize LMFBR technology is less than $2,000,000,000 without consideration of the prospect of increased utility industry financing.

Principal contractor organizations working on the project are Westinghouse Electric Corporation as the lead reactor manufacturer, General Electric Company (GE) and Atomics International (AI) as reactor manufacturers, Burns and Roe, Inc. as the architect engineer, and Stone and Webster Engineering Corporation as the constructor. In addition, approximately 205 manufacturers in some 32 states and the District of Columbia are currently under contract to produce equipment and hardware for the project.

With the full support of the Administration for completion of the project, the Agency has instituted the necessary actions to permit completion of the CRBRP at the earliest possible date. Full licensing review by NRC has been reactivated; the management structure has been reorganized and strengthened; and contractual arrangements are being streamlined and made more cost-effective.

In regard to licensing, significant accomplishments include (1) receipt of NRC authorization pursuant to 10 CFR 50.12 to conduct site preparation activities; (2) completion of environmental hearings; and (3) issuance by NRC of the Site Suitability Report and the Supplement to the CRBRP Final Environmental Statement; both of these documents contain findings favorable to the project. Continued progress in the licensing area is expected to lead to NRC authorization in FY 1983 to begin safety related construction activities in early FY 1984.

Other aspects of the project are well advanced. By the end of FY 1983, design of the plant will be near completion; about $750,000,000 of the hardware required for the plant will be on order or delivered; and hardware deliveries alone will be valued at approximately $406,000,000. Consistent with NRC's authorization, site clearing and excavation will proceed during FY 1983.

The FY 1983 planned program accomplishments are based on a total funding level of $193,922,000 which is the FY 1982 appropriated amount. This represents a continuation of the FY 1982 level of effort. The actual FY 1983 funding level for CRBRP will be determined in accordance with the provisions of the FY 1983 Continuing Resolution. When this final level has been determined, the base program funding level will be adjusted to incorporate any CRBRP variances.

During FY 1984, site preparation will be completed. Most temporary support buildings (yard facilities maintenance, administration buildings, site warehouses, craft shops, etc.) will be installed. Construction equipment including a 150-ton crawler crane and a 110-ton truck crane will be acquired. Leasing options to provide major cranes will be secured. Construction materials (reinforced steel, embedded iron, cell liner material, structural steel, etc.) will be procured. Construction of permanent plant structures will be initiated with the pouring of the nuclear island mat.

In addition to the site preparation, construction and licensing activities which will be conducted in FY 1984, design will be virtually completed during the year and continued progress will be made in the fabrication of hardware. Hardware valued at approximately $460,000,000 will have been delivered by the end of FY 1984. Component completions planned for FY 1984 include the polar crane, the service building bridge crane, the upper internals structure, the radwaste solidification system and the air blast heat exchanger. In addition, substantial progress will continue to be made on fabrication of other plant hardware, including the plant steam generators and pumps.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Capital equipment	$ 6,000	$ 6,000	$ 0

The capital equipment funding in FY 1983 will be used primarily for the purchase of equipment unique to the CRBRP.

Large scale prototype breeder

Operating expenses	$ 15,000	$ 15,000	$ 15,000

The large-scale prototype breeder effort is a joint effort of the U.S. Government and private industry to establish institutional and financial arrangements, and to develop implementation plans for proceeding with the design, construction, and operation of a commercial size breeder under a cooperative arrangement that is expected to include foreign government participation.

The agreement between the Department of Energy and the Electric Power Research Institute (EPRI) to cooperate on the large scale prototype breeder effort was executed in FY 1982. The EPRI has established a Consolidated Management Office (CoMO) to execute its responsibilities under the terms of the DOE-EPRI agreement. CoMO staff include representatives of the utility industry, reactor manufacturers and architect engineers.

CoMO efforts to be conducted in FY 1983 will be directed at: 1) establishing specifications for the large breeder which reflect the requirements of the utility industry and design commonality, where possible, with foreign participants; 2) incorporation of the appropriate design changes into the previously established large plant advanced conceptual design; 3) advancement of the design; 4) establishment of the plant schedule and cost estimate with emphasis on capital cost reduction; 5) continued evaluation of potential sites; and 6) initiation of environmental and safety documentation.

CoMO efforts during FY 1984 will be directed at finalizing all aspects of the large scale prototype breeder planning. This includes definition of plant requirements and criteria, schedule, cost estimate, site selection, research and development requirements, and financial, institutional and management arrangements. Also, the safety analysis report and the environmental report efforts will be continued. Current planning is for the major financial contribution toward the cost of this large plant to be provided by private industry with an attempt made to secure some financial contribution from foreign countries.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Base program	$287,907	$287,907	$271,800
Operating expenses	$248,299	$248,299	$240,600

The mission of the LMFBR base program is to develop the requisite technology to the point where the private sector is able to support construction and operation of safe, reliable liquid metal fast breeder reactor plants for supplying electricity to the grid. This includes the conduct of studies of the technical features and implementation options for a potential future plant project. It is to this end that the breeder technology and test facilities efforts discussed in the following paragraphs is directed.

Engineering systems and components	$ 30,349	$ 30,349	$ 30,200

Components have been a major contributor to demonstration breeder unavailability and represent a potential area for significant plant cost reduction.

The objective of the Engineered systems and components program is to advance the state-of-knowledge in component technology to the point where the technical and economic risks of designing and operating components in a future breeder reactor are acceptable and can be undertaken by the private sector. The strategy is to perform sufficient R&D to generate the technology needed to support reliable and economic component design, fabrication, and operation; and to verify adequacy by testing critical features, small models, and engineered development units. The Agency utilizes its unique facilities, including ETEC, for much of this testing and utilizes industrial facilities where they exist.

To reduce the technological risks and economic costs associated with components to a level acceptable for further private sector development, significant advances must be made in component reliability. There are two reasons for this. First, experience with breeder reactor powerplants in this country and abroad (Fermi, PFR, Phenix, BN-350, BN-600) has shown that plant component failures have been a major source of plant unavailability. Plant operational capability was seriously affected by component unreliability in three of these plants and even the most successful (Phenix) has lost more than one full power year as a result of component difficulties. The Prototype Fast Reactor (PFR) continues to be hampered by steam generator leaks, and BN-350 had a serious steam generator failure. These reliability problems are a cause not only of major economic impact, but also of potential impact on overall plant safety. As indicated in the description of the Safety base program, the first aspect of assuring plant safety is the demonstration of reactor system reliability in preventing the occurrence of accident events which could ultimately lead to plant safety problems (LOA-1). The component technology development activities, including steam generator component and leak protection system development, must support this reliability requirement.

Second, new component concepts must be developed since the requirements associated with components suitable for consideration by the private sector in plants beyond FFTF and CRBRP are different and, in some cases, much more severe than those for CRBRP. For example, since the primary pump suction requirements for future plants are much higher than for CRBRP, scale-up of the CRBRP pump concept is not possible, and development of a new concept such as a two stage pump is required. This is an area of major program focus.

In order that the private sector be able to build and operate economically competitive breeder reactors, components having major cost reduction potential must be developed and proof tested. Significant component cost reduction can be achieved by design and concept changes, supported by essential development activity, which result in smaller, lighter, and more efficient components. Further cost reduction can be achieved by elimination of excessive requirements imposed on components. Program focus in the component cost reduction area centers on primary system inducer pump, intermediate system pump, and instrumentation development, plus critical review of requirements imposed on components.

This element of the base program does not build large prototype components or large plant components for a project; this is a task for the private sector. Rather, this element performs R&D on new concepts that will form the technology base for the ultimate industrial decision. The program is carried out through generation of new concepts, identification and resolution of critical technical problems attendant upon such designs, computer code prediction of the performance of the designs, conduct of R&D to verify the prediction of the behavior of the chosen material in new configurations and in new environments, and testing of the integrated concepts as models or as test units to verify successful performance prediction and problem resolution.

The R&D underway to support component technology development includes flow induced vibration analysis including small scale IHX flow tests, flow distribution testing and analysis, mixing and stratification testing and analysis, subcomponent development and testing, fabrication process development, inspection development, maintenance equipment, and procedure development.

The FY 1984 activities include primarily critical research and development efforts on steam generators and pumps. The planned accomplishments for FY 1984 are:

o Continue preparations for sodium testing of the helical coil model steam generator and the primary system two stage pump test article.

o Initiate tube installation in the 70 MWt double-wall tube steam generator.

o Complete design and continue fabrication of the intermediate system pump sodium test article.

o Continue primary system inducer pump design to secure weight and cost savings.

o Complete demonstration of leak protection system on prototype steam generator.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Fuels and core design	$ 36,613	$ 36,613	$ 32,700

The goals and objectives of the Fuels Program are first and foremost, to prove we have a breeder fuel; to develop and prove the companion fuel blanket and absorber core component systems under prototypic conditions that demonstrate viable LMFBR core systems that are licenseable, to support the CRBRP core requirements to extend the lifetime (3 years) of core components to be economically competitive; to develop, establish and demonstrate an integrated fuel supply for FFTF and CRBRP, and to transfer the developed technology to industry. The program is scoped and sized to focus on and accomplish these goals. All of these program activities are necessary for reducing technological uncertainties to the stage whereby the private sector will be able to undertake further development and commercialization/industrialization of reliable and economically competitive LMFBR's under accept able business risk conditions.

In the core components area, proof of the initial FFTF oxide fuel and absorber systems will continue thereby providing CRBRP with reference oxide performance data which will provide assurance of reliable fuel performance. Post irradiation examination of selected driver fuel assemblies irradiated to various fractions of goal exposure will be conducted. Results of these examinations will be combined with assembly withdrawal load measurements to prove performance capability and margins of the FFTF/CRBRP oxide fuel system. Long term irradiation of fuel assemblies in FFTF utilizing reference and improved low swelling alloys (D9 and HT-9) will continue in order to extend the lifetime of the reference fuel system and qualify core components for long lifetime future breeder plants. Irradiation of an FFTF assembly test with fuel fabricated to relaxed specifications to achieve reduced costs for FFTF and CRBRP cores will continue. Oxide blanket assembly test irradiations in FFTF utilizing prototypically designed CRBRP assemblies will continue and testing of a three year absorber assembly will be initiated. Qualification of three year fuel, blanket and absorber core components will demonstrate economically competitive breeder reactor core systems required for breeder reactor industrialization.

Required core design codes for CRBRP licensing activities will be maintained and, core materials development aimed at characterizing clad and duct materials for CRBRP and future plants will continue through examination of specimens irradiated in EBR-II and in the instrumented Materials Open Test Assembly (MOTA) in FFTF.

International participation in the Core Systems and Materials Program will continue on the basis of reducing program costs while maximizing technology obtained.

In the Fuel Supply area, activities will intensify toward completing the SAF line. Final design will be completed and procurement of equipment will continue toward its installation in the rescoped FMEF to assure availability of CRBRP fuel commensurate with its late FY 1989 criticality date. Upon its completion and operation in the late 1980's the SAF line will demonstrate economically competitive breeder fuel fabrication technology that can be deployed commercially by industry.

Some of the major FY 1984 accomplishments for the fuel program are:

- o Qualify, confirm performance, and establish lifetime limits of the FFTF fuel and Absorber Systems.
- o Conduct fuel, blanket, absorber, and cladding/duct alloy program to assure safe, reliable, and predictable long life performance.
- o Continue efforts to support CRBRP fuel, absorber, blanket, and design code requirements.
- o Complete SAF line final design.
- o Continue optimizing current needs for destructive and nondestructive examination of fuels, blankets, absorbers, and materials to insure cost effective operation of national hot cell facilities.
- o Continue Run-Beyond-Cladding Breach (RBCB) and Transient Overpower Tests on oxide fuels as part of joint U.S./Japanese program in EBR-II.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Materials and structures	$ 9,835	$ 9,835	$ 8,700

As a vital part of the LMFBR program, efforts in the Materials and Structures area are needed to:

- o Assist projects in the resolution of problems typically experienced during plant design, construction, licensing and operation.

- Satisfy R&D needs identified by plant projects.
- Establish and document the technology base required for LMFBR industrialization.

The Materials and Structures program addresses the above needs by:

- Providing the technology required to assure that LMFBR components and systems will be free from structural failures during their design lifetime.
- Developing materials, design methods and criteria, materials property data, and procedures that will assure economic and safe components and systems while providing designers with sufficient flexibility in component and systems design to facilitate optimization.

The overall strategy includes (1) developing and providing timely design tools and guidance to design teams, (2) performing necessary R&D in support of the ultimate design choices, (3) maximizing the use of information derived from previous generic and specific (e.g., FFTF, CRBRP) research and development, and (4) maximizing the use of information derived from foreign exchange agreements. While early program emphasis was on structural integrity to assure reliability and safety, increasing emphasis is being given to economic considerations and the ability of the private sector to proceed with the next LMFBR plant.

The products of the program are of the same type as have been required for the light water reactor industry and consist of technical guidelines, design rules, design procedures, data and documentation. Thus, the deliverables include reports, guideline documents, contributions to consensus standards (e.g., ASME-BPV codes and ASTM standards), and a handbook that is a repository for design data. These deliverables are essential to component design engineers, manufacturers, and plant operators during the design, construction, licensing and operation of LMFBR plants. The program output is relied upon as a principal technical data base for U.S. nuclear regulatory actions.

Planned accomplishments in FY 1984 include:

- Complete the development of methods for inservice inspection of double-wall tube steam generators.
- Complete the development of seismic analysis methods for LMFBR core assemblies.
- Publish design methodology for elevated-temperature piping expansion joints.
- Develop design methods and criteria for elevated-temperature weldments.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Physics	$ 9,031	$ 9,031	$ 8,700

The purpose of the physics program is to prove and reduce to practice LMFBR data bases and analytical design capabilities needed for FFTF operation, CRBRP licensing, startup and efficient performance, and confident design of a near-competitive plant. Key elements maintained in the program are acquisition, testing and implementation of detailed nuclear data and analytical design capabilities, measurements and analyses of physics parameters in critical assemblies, and analyses of advanced core and shield design options. Selected priority efforts provide direct support of specific CRBRP licensing matters and studies of FFTF operating data, and contribute capabilities needed by industry for predicting the design and safety of future LMFBR plants.

Remaining major requirements are for critical experiments in large assemblies, improved control system design so that sensitive static and time dependent power capability can be maintained at high and economic levels, faster computational tools to reduce costs of extensive three dimensional burnup and reload analyses, evaluation of design options to enhance safety aspects of core behavior, reduction of uncertainties in safety-related parameters so that costly margins of conservatism can be reduced without any loss of safety, and analytical and experimental design optimization to reduce costs of more complex shielding.

To more sharply focus on such key technical needs within reduced budgets, consolidation of the physics program is required. The ZPR 6/9 critical facilities at ANL were shut down, and all critical experiments are now centralized at the ANL-W ZPPR facility. Data evaluation efforts are being reorganized and reduced. This forces a delay in the final revision of the national evaluated data file (ENDF/B) for LMFBR but enables early completion of prerequisite measurements. Some of the tasks on calculational methods and codes maintained through FY 1982 were concluded, and milestones for some other tasks in this area were delayed. Initiation of shielding experiments was deferred, and development of techniques for materials dosimetry was phased out.

Major program accomplishments expected in FY 1984 are:

o Perform engineering benchmark criticals for 700 MWe-scale heterogeneous cores in ZPPR. These will address aspects of design for which no confirmatory data exist.

o Perform analyses of the most crucial shielding issues for advanced LMFBRs.

o Validate advanced transport and three dimensional design methods and data files in terms of needs for accurate and economical analyses of large critical experiments, reactor operating data, and industrial design of advanced LMFBRs.

o Perform measurements of nuclear data required for later completion of ENDF/B-VI.

o Perform analyses of early FFTF operations and fuel burnup contributing to evaluation of neutronic methods and data bases for CRBRP and future plants.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Safety	$ 33,014	$ 33,014	$ 32,800

The safety program supports the licensability and industrialization of the LMFBR by performance of work to assure and demonstrate the public safety of large breeder reactors. It beneficially influences LMFBR design by identifying and exploiting inherent plant characteristics to enhance safety, reduce complexity, and reduce capital cost. Action will be taken in parallel with these activities to develop plant safety design criteria and a licensing approach which will reflect the renewed emphasis on inherency, improved safety, and reduced cost.

The program addresses important technical issues in both accident prevention and mitigation of accident consequences as follows:

o reliability of plant systems and safety features - through accumulation and analysis of performance data from operating plants.

o safety margins under degraded plant conditions - through verification of sodium natural circulation cooling under extreme transients.

o accommodation of core disruptive accidents - through demonstration of adequate containment of energetic accidents and heat-producing accident debris.

- plant siting and accident health effects - through demonstration of limited fuel aerosol releases to the environment.

To accommodate budget reductions while maintaining a viable safety program responsive to CRBR and other future LMFBR needs, some elements of the program have been consolidated. A major change has been made by consolidation of activities in the in-pile experiments program in TREAT. This program provides essential data on behavior of fuel and coolant during postulated accidents. Work will continue on upgrading the TREAT reactor to provide essential improvements in safety testing capabilities. Also, a viable program of operational safety experiments will be maintained utilizing the EBR-II reactor facility.

Major program accomplishments expected are:

- Complete three safety transient tests of breeder reactor fuel in TREAT.
- Complete the first major decay heat removal test series in the Thermal-Hydraulic Out-of-Reactor Safety (THORS) Facility.
- Complete Self-Actuated Shutdown System (SASS) component development and provide large plant project with recommendations on preferred configuration and integrated system testing.
- Complete a water experiment which validates multidimensional computer codes for in-vessel decay heat removal in large plant designs.
- Complete severe protected sodium natural circulation tests in EBR-II.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Test facilities	$124,233	$124,233	$122,500

The major objectives of the test facilities effort are to provide an experience base for safety, components, and system operation. This experience provides a proven baseline for scaling up systems and components. It also provides to plant projects and the base technology program a library of developed and verified sound operating and maintenance procedures. The test facilities effort will operate and maintain facilities and multi-program sites at HEDL, ETEC, and ANL to meet LMFBR program test requirements and schedules established by the breeder technology R&D program. The test facilities objectives are achieved with continued use of cost and schedule controls as applicable to ensure economic and efficient use of the test facilities. The actions initiated in prior years to consolidate testing and demonstration activities will continue. Existing facilities will be used where they are adequate for R&D program needs; surplus facilities will be phased out. Initiatives will be pursued to further reduce operating costs of the various test facilities.

ANL facilities	$ 34,113	$ 34,113	$ 36,150

The ANL effort will be largely accomplished at the ANL-West (ANL-W) site at the INEL in Idaho. In addition, operating funds will be used to provide for facility operations including operating personnel, maintenance, materials, fuel consumption, and other essential support activities. These activities provide plant and component operating experience in addition to specific testing efforts in support of the fuels, safety and physics programs. Continuing efforts will be made toward finding means to achieve economical long term testing of key components, such as steam generators.

At the ANL-West site at INEL, the facilities to be operated are:

- The EBR-II is a 62.5 MWt - 20 MWe sodium-cooled pool-type fast reactor. EBR-II will continue operation as a complete powerplant, generating electricity and providing information and experience concerning liquid sodium cooled plant operation, maintenance and component performance; it will continue steady-state irradiations of fuels and materials at a reduced level and only supplementary to FFTF. The reactor is deployed to conduct an operational reliability test program covering sustained operation of breached fuel elements, transient overpower and undercooled testing of intact and breached fuel, and shutdown heat removal testing. Fuel fabrication activities will be continued to provide fuel inventory to complete the planned program of testing in EBR-II.

- The Hot fuel examination facility (HFEF) is integral to the EBR-II site and is comprised of two adjacent hot cell complexes--HFEF north and HFEF south. The HFEF provides the operational support to EBR-II, i.e., the capability to examine and reconstitute experimental subassemblies irradiated in EBR-II for breeder reactor programs on fuels and materials. HFEF will be used for FFTF postirradiation examinations. In addition, HFEF will continue to be used to assemble, disassemble, and examine tests from TREAT.

- The Zero power plutonium reactor (ZPPR) is the world's largest and most flexible critical facility. Benchmark and mockup experiments will be carried out at ZPPR during the 1980's to guide and confirm the designs of cores which may incorporate such additional features as heterogeneous configuration, advanced fuels, and high burnup capabilities.

- The TREAT reactor is a transient test reactor. It will be operated to evaluate performance of multi-pin fuel bundles under specific transient conditions during the first part of FY 1984. The facility will be shut down for TREAT upgrade construction activities to extend its capability to irradiate larger multi-pin reactor fuel bundles and structural materials under conditions simulating various types of nuclear excursions and transient undercooling situations.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
ETEC facilities	$ 23,053	$ 23,053	$ 24,000

The Energy technology engineering center (ETEC) is an Agency field laboratory that is located 40 miles northwest of Los Angeles and is operated by Rockwell International. ETEC has several large on-site nonnuclear sodium testing facilities with unique capacity to test Fast breeder reactor components under all operating conditions, and is the Breeder program's nonnuclear component testing center.

The ETEC effort will have completed the testing of the CRBRP prototype pump in the Sodium pump test facility (SPTF) and test preparations will be underway with SPTF for the two stage primary pump sodium test unit. The CRBRP prototype steam generator test program will have been completed in the Sodium component test installation (SCTI). Preparations will be completed for testing a 70 MWt steam generator test unit in SCTI which is to follow the 117 MWt CRBR Plant prototype test unit. Continuing efforts will be made toward finding means to achieve economical long term steam generator testing capability.

In the small components test loop (SCTL), sodium testing on small valves for the CRBRP program will be completed and testing of commercial values will continue. Testing in SCTL will be accomplished on selected small reactor components and subsystems. The ETEC static sodium test facilities will continue tests on instruments such as those used to measure sodium flow, level, and pressure in CRBRP and LMFBR test facilities.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
General support	$ 4,400	$ 4,400	$ 4,150

Efforts include support of the assignment of contractor personnel to Japan for the LMFBR development program, plutonium oxide conversion for fuel development, and general program and nuclear related studies, assessments, and nuclear training programs by LMFBR laboratories and contractors.

HEDL facilities	$ 62,667	$ 62,667	$ 58,200

The HEDL effort will focus on operation of the FFTF and ancillary support facilities, construction of the Fuels and material examination facility (FMEF) and the installation of SAF fuel fabrication line equipment.

The FFTF is a 400 MWt liquid metal (sodium) cooled fast-neutron-flux reactor designed specifically for irradiation testing of nuclear reactor fuels and materials for fast breeder reactors. It is located at the Hanford engineering development laboratory (HEDL) in Richland, Washington, and plays a key role in breeder reactor development and testing activities. It provides a test bed for demonstrating and evaluating the performance of breeder reactor fuel assemblies and partial core loadings at reference conditions.

Although FFTF, as a testing reactor, is not designed to breed fuel or to produce electricity, it provides vital information for plant design and base-technology programs in the areas of plant system and component design; component fabrication; and prototype testing. In addition, FFTF provides experience in the operation and maintenance of a reactor plant having coolant loops and components at temperatures and coolant velocities typical of LMFBR powerplants. This experience combined with the operating and maintenance experience from other test facilities provides a proven baseline for scaling up systems and components. FFTF can be used to test fuel elements up to and including failure under dynamic sodium flow conditions to establish ultimate capability and failure modes. Understanding of failure modes is essential to establish reactor core reliability, performance, and maximum life. It is used in tests to develop the advanced fuels and the advanced cladding and duct materials essential to attaining long lifetime, high performance LMFBR core components.

The Fuel Storage Facility, located adjacent to the FFTF, is used to store and remove decay heat from irradiated FFTF fuel and reactor experiments. The Maintenance and Storage Facility, also located adjacent to the FFTF, provides for sodium removal, decontamination, repair, storage, and staging of large components for the FFTF and related breeder reactor program facilities.

INEL facilities	$ 0	$ 0	$ 0

The ETR was placed into an inactive standby status in FY 1982 following completion of the series of experiments under the sodium breeder reactor safety program. No FY 1984 funding is requested for ETR.

Safeguards and program assurance	$ 5,224	$ 5,224	$ 5,000

Safeguards and security efforts will provide for physical security systems and methods of material control and accountability in order to provide an integrated safeguards system for Agency facilities within the Nuclear energy sector which acquire, use, store, and dispose of special nuclear materials. The FY 1984 funding request will provide for continued safeguards and security operations at ANL and HEDL. The program assurance effort (including operational safety, quality assurance and standards) will help assure that civilian nuclear reactor projects and waste management projects within the Nuclear energy sector are carried out in a safe, reliable, and effective manner.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Change in inventories	$ 0	$ 0	$ 0

This effort includes the net change in the inventory of fuel fabrication and special process spares for the FFTF and EBR-II reactors. Funds for procurement or withdrawal of fuel and fabrication special process spares and common use stores are included in the program accounts. This account also includes the common use stores activities. If inventory transactions are required in FY 1984, program funding will be transferred into this account from the applicable program.

Capital equipment	$ 14,608	$ 14,608	$ 19,100

The requested funding supports specialized and miscellaneous equipment and instrumentation requirements for research, development, engineering and technical studies associated with LMFBR's. Also included is automated data processing equipment to support nuclear energy's requirements.

Base program	$ 4,608	$ 4,608	$ 5,600
Breeder technology	$ 875	$ 875	$ 740

The Fuels and core design funding supports several key activities including the maintenance of capability postirradiation examination hot cells and replacement and upgrading of materials examination equipment.

Safety program funding will provide for acquisition of experiment support equipment.

Test facilities	$ 3,733	$ 3,733	$ 4,860

This activity provides the essential capital equipment support for test facilities operated to carry out the breeder fuels, materials, safety, and reactor programs and for the general purpose equipment, which gives critical support to the activities at assigned sites. Replacement of obsolete and worn equipment of high priority will be accomplished.

Funding in FY 1984 will be used for procurement of equipment to support maintenance of sodium-wetted and/or radioactive plant equipment associated with the FFTF, EBR-II, and Advanced test reactor (ATR) and with large component nonnuclear test facilities.

It also includes such items as reactivity meters, radiation monitoring equipment and instrumentation required for test analysis, data analysis and data acquisition.

General purpose equipment for overall site use covers those items required to maintain services used by all programs utilizing the site. This includes laboratory, machine-shop and information system equipment.

Secure automated fabrication line equipment	$ 10,000	$ 10,000	$ 13,500

The Secure Automated Fabrication (SAF) program has as its objective to develop and demonstrate an advanced manufacturing SAF line for plutonium oxide breeder reactor fuel pins. This line will be the source of fuel for the FFTF/CRBRP. The SAF line is to be installed in the FMEF at Hanford and will utilize technology that focuses on improved safety features for plant operating personnel, the public, and the environment. Equipment and process improvements incorporated by the SAF line will yield significant gains in nuclear materials safeguards, product quality, and productivity and cost. The SAF line provides the key link between development and full-scale demonstration of technology that will enable commercialization of LMFBR fuel fabrication on an economically competitive basis in the future.

The requested funding will permit a SAF line schedule that will meet fuel requirements for CRBRP criticality in late FY 1989. Additional funding, however, beyond that planned will be required in FY 1985 so that all remaining equipment items can be ordered early in FY 1985.

The more significant items to be procured include the powder blending system, powder milling subsystem, binder addition equipment, preslug and granulation subsystem, pellet presses, sintering system components, pellet gaging and finishing system equipment, pin loading and welding equipment, scrap and waste processing system components, and miscellaneous material transport and process equipment. The total estimated cost of SAF line equipment is $48,000,000.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Construction	$ 25,000	$ 25,000	$ 12,100

The requested funding will provide for modifications to reduce cost and to save fuel in performance testing of steam generators at ETEC in addition to essential facility and site upkeep as general plant projects and reactor modifications. Since FY 1978 the annual LMFBR construction funding has decreased more than $100,000,000 in completing the acquisition of required facilities. Current construction efforts are directed toward minimizing long-term program funding needs.

ANL facilities	$ 9,900	$ 9,900	$ 4,200

The major breeder reactor facility activities at ANL provide plant and component operating experience. These facilities include the EBR-II, HFEF, TREAT and ZPPR which will be supported by reactor modification and general plant projects.

At ANL, construction funds will be applied to the Safety research experimental facilities (SAREF)--TREAT upgrade (TU) project (78-6-c). The upgrade will provide capability to accommodate large bundles of test pins and to provide improved thermal hydraulic simulation. The safeguards perimeter assessment construction at ANL-W will be continued.

ETEC facilities	$ 6,000	$ 6,000	$ 5,500

At ETEC, General plant project construction will be performed, and construction of Phase B of ETEC facility modifications (78-6-e) will be continued for completion by late FY 1984, and Phase C modification will be underway. Phase B modifies the Sodium Pump Test Facility for testing the two stage primary pump sodium test unit and the intermediate pump sodium test unit. Phase C installs energy saving equipment in the Sodium Components Test Installation.

HEDL facilities	$ 9,100	$ 9,100	$ 2,400

At HEDL, the requested funds will provide the necessary GPP in support of the facilities and utilities in the 300 and 400 areas. Reactor modifications are also included.

Construction of the FMEF will continue on a schedule consistent with revised program requirements and within previously appropriated funds. FMEF is designed to accommodate the SAF line equipment as described previously. Post-irradiation examinations consistent with the revised LMFBR program will be performed in the FFTF Interim examination and maintenance (IEM) cell, at the Hot fuel examination facility (HFEF), and at already existing hot cells at HEDL. The TEC for the FMEF has been reduced in accordance with the foregoing to the previously appropriated amount of $174,900,000.

Water cooled breeder	$ 44,984	$ 44,984	$ 35,500

The Water Cooled Breeder program's mission is to develop technology for significantly improving the efficiency of nuclear fuel resource utilization by water cooled nuclear reactors used for electrical power generation. The concept being evaluated is a self-sustaining breeder reactor, cooled and moderated with ordinary (light) water and fueled with uranium-233 and thorium.

The objective is to accomplish the following: prove that breeding can be achieved in a light water nuclear reactor using the uranium-233/thorium fuel system; confirm a practical way to use thorium, a plentiful source of fuel for which there has been no major energy-related use; show the feasibility of installing prebreeder and breeder cores of the Light Water Breeder Reactor type in existing and future pressurized water reactor plants using current types of plant components and systems; and make the technology developed under the program available to commercial industry. A further technical benefit of this program is the significant improvement in the efficiency of using nuclear fuel resources that is expected to be realized for this technology.

A light water breeder core was installed in the Shippingport Atomic Power Station in 1977. Shippingport began operation in 1957 and was the first commercial nuclear power station in the United States. The station provided the basis for much of the technology leading to present central station light water nuclear powerplants.

On October 1, 1982, the light water breeder core had accumulated more than 26,900 effective full power hours while supplying electric power to the Duquesne Light Company distribution system. Since start-up, the light water breeder core has performed successfully in both sustained operation at high power and periodic swing load operations during which reactor power was varied as would be required to meet power load demands.

Successful confirmation of breeding in the Shippingport light water breeder core will provide the basic technology which would make available for power production about 50 percent of the energy in the nation's thorium reserves, a source of energy many times greater than the known fossil fuel reserves. This concept is the only known approach using the proven technology of the light water reactor system for increasing fuel utilization efficiency significantly beyond the approximately one percent achievable with present types of light water thermal reactors.

The efforts to be conducted within the Water Cooled Breeder program in FY 1984 will primarily be Defueling activities and Core evaluation.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Operating expenses	$ 44,784	$ 44,784	$ 35,500
Defueling activities	$ 34,284	$ 34,284	$ 33,000

In October 1982, the Shippingport plant ceased routine operation with the Light Water Breeder core and end-of-life testing and reactor defueling began. The Shippingport defueling effort will take approximately 2 years, ending in FY 1984. The overall defueling activities will continue until completion of fuel shipments for the Expended Core Facility (ECF) to the Idaho Chemical Processing Plant in 1987.

Efforts associated with the defueling process in FY 1984 include: maintaining the Shippingport plant and providing instrumentation, control, and electrical power system operational support for the light water breeder core defueling; completing core defueling, head area disassembly, fuel removal, and equipment disposal; disassembling fuel modules for shipment; continuing ongoing training of personnel at the Expended Core Facility in Idaho to receive and handle the spent fuel; continuing preparation of procedures and installation of equipment; shipping the spent fuel and receiving the spent fuel modules at ECF; placing the shipping containers in the water pits, unloading the containers, and transferring the fuel to water pit storage receptacles. Other defueling efforts will include: providing radiation analysis for component disposal and disposing of removed core components, shipping a spare fuel module and fuel rods to the Idaho Chemical Processing Plant for storage; and preparing the Shippingport plant for turnover to the DOE Office of Waste Management upon completion of the defueling and shipment of the spent fuel.

Assessment and disposal of components removed from the Shippingport reactor vessel prior to installing the light water breeder core will continue. This includes shipment of the lower core barrel from the previous core.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Core evaluation	$ 10,500	$ 10,500	$ 2,500

A detailed core evaluation at the Expended Core Facility is necessary to determine the condition of the core and establish the extent of breeding achieved. Core evaluation is expected to take 5 years.

During FY 1984, work conducted under the Core Evaluation subprogram will include: assessing end-of-life test data; publishing technical reports documenting the Shippingport Light Water Breeder Reactor performance; preparing for examination and proof-of-breeding work; and conducting work necessary to provide fuel rods for destructive analysis. Destructive analysis work is funded under the DOE Fuel Cycle Program.

Capital equipment	$ 200	$ 200	$ 0

Capital equipment funds are not requested in FY 1984.

Program direction	$ 8,061	$ 8,061	$ 10,200
Operating expenses	$ 8,061	$ 8,061	$ 10,200

The FY 1983 appropriation is low and does not reflect the actual level of funding because of the utilization of unobligated balances carried over from prior years.

In FY 1984, 88 FTE's and 7 OTFTE's are requested at Headquarters for the breeder program. This request does not include estimates for Federal personnel costs and positions for the Water cooled breeder program which are inseparable from those included in the Naval reactors development program. Efforts in FY 1984 would include:

- Providing technical program direction, guidance, overview, and integration of the contractors' activities.
- Handling international cooperative agreements with France, Federal Republic of Germany, Japan, Switzerland, United Kingdom, and the Union of Soviet Socialist Republics.
- Performing all administrative aspects, such as, procurement, budgeting, preparing financial plans, and long and short range program planning.

In FY 1984, 33 FTE's and 2 OTFTE's are requested for the FFTF program office at Richland, Washington, and 40 FTE's and 1 OTFTE are requested for the CRBRP project office in Oak Ridge, Tennessee. The increase of 3 FTE's over FY 1983 at the CRBRP office is required to manage the expanded scope of project activities in FY 1984 which includes increased hardware fabrication efforts and the start of full construction activities. The FFTF program office manages the operations of FFTF and other test facilities and breeder technology efforts at HEDL.

DEPARTMENT OF ENERGY
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
BREEDER REACTOR PROGRAMS
(dollars in thousands)

Project Number	TEC/ TPC	Project Title and Location	Phase	Funds Appropriated to Date	Total Obligations		Total Cost	
					Planned	Actual	Planned	Actual
84-N-102	$ 1,000	Modifications to reactors, various locations	Planning	$ 0	$ 0	$ 0	$ 0	$ 0
84-N-101	--	General plant projects, various loccations	Planning	$ 0	$ 0	$ 0	$ 0	$ 0
83-N-334	$ 2,000 2,029	Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	Planning	$ 0	$ 0	$ 0	$ 0	$ 0
78-6-e	$ 36,000 55,899	Energy Technology Engineering Center facility modifications, Santa Susana, California	Construction, Phase B	$ 22,800	$ 22,800	$ 22,800	$ 13,700	$ 13,701
78-6-c	$ 44,300 59,700	Safety research experimental, Argonne National Laboratory-West, INEL, Idaho	Construction	$ 34,200	$ 34,200	$ 34,023	$ 28,000	$ 27,998

FY 1984 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reactor Research and Technology

1. Title and location of project: Modifications to reactors, various locations

2. Project No.: 84-N-102

3. Date A-E work initiated: 1st Qtr. FY 1984

5. Previous cost estimate: None
Date:

3a. Date physical construction starts: 3rd Qtr. FY 1984

6. Current cost estimate: $1,000
Date: December 1982

4. Date construction ends: 4th Qtr. FY 1987

7. Financial schedule

Fiscal Year	Obligations	Costs
1984	$ 1,000	$ 200
1985	0	400
1986	0	300
1987	0	100

8. Brief physical description of project

This project provides for improvements to the Experimental Breeder Reactor II (EBR-II) at the Argonne National Laboratory site at the Idaho National Engineering Laboratory in Idaho, and the Fast Flux Test Facility (FFTF) at the Hanford Engineering Development Laboratory in the state of Washington. Currently, a number of improvements based upon operating experience are candidates for this project which will improve the efficiency and reliability of operating these major reactor and support facilities. Selection of the specific projects will be made at a future date when the highest priority projects can be better identified.

9. Purpose, justification of need for, and scope of project

Previous reactor operating experience and data acquisition has produced information relevant to improved reactor and support facility operations and improvement to maintain a high level of safety. The purpose of this project is to maintain the safety and reliability of reactor operations.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Modifications to reactors, various locations
2. Project No.: 84-N-102

10. Details of cost estimate

Details of cost estimate for this project is not available at this time. Detailed cost estimate for modifications to reactors are normally made after the job has been scoped, and preliminary engineering completed.

11. Method of performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements

No narrative required.

13. Narrative explanation of total project funding and other funding requirements

No narrative required.

FY 1984 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reactor Research and Technology

1. Title and location of project: General plant projects

2. Project No.: 84-N-101

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 4,000
Date: December 1982

7. Financial schedule

Fiscal Year	Obligations	Costs FY 1982	FY 1983	FY 1984	After
1981	7,500	3,078	3,463	320	639
1982	7,468	1,397	1,700	2,610	1,761
1983	3,000		600	1,050	1,350
1984	4,000	0	0	1,200	2,800

8. Brief physical description of project

These projects provide for the many small alterations, additions, modifications, replacements, and new construction items required annually at the various Agency installations for continuity of operation, improvement in production techniques, road and street improvements, elimination of health and safety hazards, fire hazards, and minor changes in operating methods and are essential to protect and upgrade the government's investment by preventing excessive deterioration and obsolescence which support Agency programs at the Argonne National Laboratory (ANL), Energy Technology Engineering Center (ETEC) and the Hanford Engineering Development Laboratory (HEDL) sites. The request also includes the costs of installed capital equipment integral to a subproject.

9. Purpose, justification of need for, and scope of project

Work under general plant projects has included modifications or improvements to existing buildings and other facilities, additions to buildings to house new machinery, equipment and personnel, construction of small new buildings, replacement or additions to roads and utility lines, and general area improvements. Support of

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: General plant projects 2. Project No.: 84-N-101

9. Purpose, justification of need for, and scope of project (continued)

general plant projects of this type is necessary to meet new and continuing needs of production, research and development programs, and to provide for safe and economical operations. The highest priority projects, to be accomplished within available funds, are identified below.

ANL

Roof Reconstruction, Buildings 768 and 791. This project will remove damaged roofing, insulation, cant strips, plywood diaphragm and damaged structural members and fascia. Replace with new materials or repair where feasible. Persistent leakage has caused significant deterioration of plywood diaphragm and the wood-steel joint framing. Supplementary insulation will be added to undamaged areas and new insulation placed over damaged areas to upgrade the roof to current energy conservation standards.

Rehabilitate Industrial Waste and Drainage Ditches. Approximately 1200 linear feet of ditches will be regraded and ditch lining will be placed to carry the normal industrial waste flows. Pit run gravel will be placed alongside the lining to complete the bottom of existing wide ditches. The ditches have abundant growth of vegetation which has been a source of continuing maintenance problems. The lining should dry up the ditches and thus eliminate the vegetation.

Conversion of water treatment to ion exchange, Building 129. This project provides for the installation of a complete automatic package ion exchange water softening system at the water treatment plant, Building 128. The new equipment will replace the lime/soda ash portion of the existing treatment process. The new system will have a maximum capacity of 2,000 gallons per minute and will reduce the hardness of the raw water from 500 parts per million to 100 parts per million as calcium carbonate. The system will require two regeneration cycles per day at 1 million gallons per day total output. The distribution pumps in Bldg. 129 will be automated to operate by a signal from the existing water level meter in Bldg. 129.

The new system will be housed in an adjacent Building 128 which is now used as a warehouse for storage of bags of chemicals associated with the existing softening process. The system will be connected to the well water supply line south of Building 128 and the outlet of the system will be piped overhead to the softwater well in Building 129. The regenerate waste will be pumped to the laboratory sewer. Start-up engineering services, all manuals and instructions will be furnished.

Replace Askarel filled transformers, Buildings 206, 208, and 211. This project is part of a plan to insure electrical reliability by retiring 35 year old transformers on a scheduled basis (originally installed some 30 years ago as WW II surplus). The plan gives priority to replacing the oldest equipment deemed to be associated

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: General plant projects   2. Project No.: 84-N-101

9. Purpose, justification of need for, and scope of project (continued)

with the most critical research operations. A side benefit is removal from the site of a substantial amount of polychlorinated biphenols (PCB's) used as insulating fluid in this old equipment.

Rehabilitation of variable temperature rooms, Building 202. This project will rehabilitate four variable temperature rooms, C115 (48 sq. ft.), C117 (60 sq. ft.), C119 (60 sq. ft.) and C121 (48 sq. ft.) to include replacement of wall and ceiling insulation, the equipment associated with temperature and air delivery systems, and measurement devices. These changes must accommodate experimental requirements for constant humidity (45-50 percent ± 1 percent) and temperature (19-30 deg. c ± 0.5 deg. C) in each of the four rooms. Two of the rooms are, in addition, required to have variable temperature control and a capacity to hold temperature at levels down to 5 deg. C.

ETEC

SCTI H-1 Sodium Preheater. This project provides for the installation of a sodium to gas heat exchanger in the flue of the H-1 sodium heater exhaust stack. Such a heat exchanger was in operation in the H-1 since it was originally installed. Failure of the original sodium preheater occurred in 1980 due to intergranular attack of the tubes. By conserving energy, this project would pay for itself in 1.7 years.

Water System Rehabilitation. This project consists of the replacement of the badly deteriorated south loop of the domestic water distribution system extending from the intersection of 17th and B Streets to Building 003. The scope would include the replacement of approximately 2200 ft. of 12-in. and 8-in. distribution piping, and sectional control valves.

HEDL

FFTF/FEMF Security Integration. This project will electronically connect the new FMEF Security System into the FFTF Intrusion Detection System (IDS) so that both can be monitored from a central location; the Hanford 400 Area Security Operations Center. This work must be completed by the fall of 1984 when FMEF becomes operational.

400 Area Sanitary Sewer Improvements. This project will provide new surface percolation ponds for final disposal of the treated sanitary sewage from the 400 Area. A larger dosing chamber will also be added and appropriate piping changes will be made. Due to clogged drainfield tiles and improper soil percolation conditions, the percent leach field is not functioning as designed.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: General plant projects

2. Project No.: 84-N-101

10. **Details of cost estimates**

Details of cost estimates for these projects are not available at this time. Detialed cost estimates for general plant projects are normally made in connection with the request for directive after the need for the work has been established, the job has been scoped, and preliminary engineering completed.

11. **Method of performance**

Design will be by the operating contractor and negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. **Funding schedule of project funding and other related funding requirements**

No narrative required.

13. **Narrative explanation of total project funding and other funding requirements**

No narrative required.

FY 1984 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Argonne National Laboratory

1. Title and location of project: Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho

2. Project No.: 83-N-334

3. Date A-E work initiated: 2nd Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $ 2,500
Date: September 1980

6. Current cost estimate: 2,000
Less amount for CP&D: 0
Net cost estimate: $ 2,000
Date: December 1982

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	2,000	400	400	100
1984	0	1,000	1,000	600
1985	0	600	600	1,300

8. Brief physical description of project

Scope

This project will design, procure, install, and implement operation of: 1) a system for television appraisal of perimeter alarms at the ANL-W site, monitored in the Hardened Communication Center (HCC), Building 701; 2) surveillance of areas where Category I quantities of SNM are stored; and 3) lighting modifications and additions to provide necessary light levels for CCTV appraisal and surveillance.

Alarm Appraisal

The alarm appraisal system at the ANL-W site will incorporate 6 or more remotely controlled low-light cameras with 10:1 zoom lenses mounted in environmental housings and placed on motorized pan-tilt mounts. The cameras will be strategically located on buildings and other structures that will allow viewing of the ANL-W site

1. Title and location of project: Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

8. Brief physical description of project (contd.)

perimeter and areas of security interest beyond the fences and within the site. Fixed cameras will view areas of special interest. The pan-tilt-zoom cameras will be preprogrammed to automatically record the field of view when a perimeter alarm signal is received. The Security Inspector can then play back the scene so an appraisal of the alarm can be made.

The camera signals will be routed to a video switcher system in the Security Building 701. The switcher will be interconnected with the perimeter alarm system, permitting automatic call-up of the appropriate pan-tilt-zoom camera preprogrammed to view the alarmed zone. The switcher will also direct the signal of the appropriate pan-tilt-zoom camera to a video tape recorder and recording monitor. The necessary circuitry will be incorporated to insert the time, date, and alarm address number on the display and the video tape. Automatic iris control will be provided to adjust the cameras to changing light conditions. Manual over-ride will be provided on pan-tilt-zoom and iris control functions so that the operator can view areas within the site and beyond the fence line. Two of the cameras on the north side of the site will be able to survey the Radioactive Scrap and Waste Facility. Switching capacity will be provided for future transmission of video signals to the INEL Security Command Station, Building 606. However, the interface and transmission equipment to the INEL control facility is not part of this project.

Interior Surveillance

The video switcher system will control and receive signals from 20 existing and planned cameras used to monitor access to and the 2-man occupancy of storage areas at the ANL-W site. It is planned to replace older cameras with equipment of the sync type which have the stability characteristics required for the system.

9. Purpose, justification of need for, and scope of the project

The purpose of this project will be to provide the capability for near real-time appraisal of human intrusion or other phenomena that may cause sensors at the ANL-W site to alarm.

In the present state-of-the-art of alarm systems there are no systems available which will reliably detect a human intrusion and discriminate among all other phenomena that will cause nuisance alarms. Vibration, seismic, and sonic devices are triggered by rain, hail, wind, or traffic; electromagnetic field devices respond to lightning or other electrical disturbance; radar, sonar, and microwave intrusion detectors respond to small animals, large birds, or flocks of small birds, etc.

CONSTRUCTION PROJECT DATA SHEETS

Argonne National Laboratory

1. Title and location of project:	Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

9. Purpose, justification of need for, and scope of the project (contd.)

The cause of a nuisance alarm can often be identified if the zone can be viewed when the alarm sounds. If the assessment must be made by sending guards to the zone, the cause is often no longer apparent when the assessor arrives. Effectiveness of the guard force deteriorates very rapidly when unexplained alarms become a serious nuisance. This in turn can be used by a knowledgeable intruder to disperse the guard force and render it ineffective. Television appraisal overcomes this vulnerability.

Guard towers and CCTV systems provide means for rapid alarm appraisal. Both systems were examined and CCTV was found to provide better security and be more cost effective than guard towers when the system is keyed by the alarm system and when the events are recorded by a video recorder. Each 24-hour manned guard tower requires 5 guards on the payroll to man it. The scanning systems were rejected because they do not provide near real-time assessment capability due to the time required to find and focus in on a potential target. Alarm coupled camera positioning is a compromise between the real-time capability of fixed cameras and the search delays of a manually-operated scanning system. Manual over-ride of the automatic features allows the tactical use of the pan-tilt-zoom CCTV system to be utilized during an intrusive confrontation.

DOE 5632.2, paragraph 8 b (12) requires a Perimeter Intrusion Alarm (PIA) System as a means of protecting SNM. Paragraph 6 m, DOE 5632.2 defines a PIA system as consisting of (1) sensors, (2) alarm assessment systems, and (3) alarm reporting systems. ANL-W currently has sensors and alarm reporting systems but lacks the alarm assessment system. To meet the alarm assessment requirement, Security Inspectors are currently required to conduct hourly perimeter patrols. Installation of this equipment will eliminate this hourly patrol requirement.

Current Agency security orders require means for positive control by guards of the access to areas containing nuclear material, restriction of the access to designated individuals possessing security clearance, and enforcement of 2-man rule for occupancy of such areas. This can be accomplished by stationing a guard at the portal, or by providing a means for remote identification of personnel and control of the door locks from a central security station. Various key badge actuated systems are available, none of which fully meet Agency requirements. Therefore, CCTV identification and control of portals is the most cost effective means of establishing such control.

Reactor control rooms and other sensitive areas, the sabotage of which could directly or indirectly endanger public health and safety, will be provided with additional physical protection measures.

CONSTRUCTION PROJECT DATA SHEETS

Argonne National Laboratory

1. Title and location of project: Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

10. Details of cost estimate

The estimate of cost of this project is based upon funding in FY 1983, completion of engineering in FY 1984, procurement of equipment in early 1985, and completion of the installation in FY 1985.

a. Engineering - 38% of b + c	$ 450
b. Equipment Procurement	500
c. Installation and Construction	700
d. Contingency - 21% of a + b + c	350
Total	$ 2,000

The above January 1981 Base Estimate is derived from estimates in "Conceptual Design of Alarm Communications and Intrusion Assessment Systems" by Profitect, Inc. (September 1979, classified CNSI). Conceptual design for this project was completed at a cost of $29,000. Escalation beyond January 1981 at 12% for FY 1981, 11% for FY 1982, and 10% for FY 1983 and later is included for each element of cost.

11. Method of performance

The equipment and final installation work will be classified CNSI and require security-cleared personnel. Design will be accomplished under a negotiated CPFF contract with a firm specializing in design of security systems. Procurement of sensitive items and equipment will be by ANL. Alarm and alarm appraisal system installation will be by negotiated CPFF contract with a Agency security-cleared contractor. Technical supervision, procurement, coordination, cost and schedule control, and reporting will be performed by a program management organization.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding						
1. Total Facility Costs						
a) Construction Line Item	$ 0	$ 0	$ 100	$ 600	$ 1,300	$ 2,000
Total Facility Costs	0	0	100	600	1,300	2,000
2. Other Project Funding						
a) Conceptual Design	29	0	0	0	0	29
Total Other Project Funding	29	0	0	0	0	29
Total Project Funding (Items 1 and 2) ..	$ 29	$ 0	$ 100	$ 600	$ 1,300	$ 2,029

CONSTRUCTION PROJECT DATA SHEETS

Argonne National Laboratory

1. Title and location of project: Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho

2. Project No.: 83-N-334

13. Narrative explanation of total project funding and other funding requirements

No narrative required.

FY 1984 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Breeder Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reactor Research and Technology

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1. Title and location of project: Energy Technology Engineering Center
Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

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3. Date A-E work initiated:
Phase A: 2nd Qtr. FY 1978
Phase B: 4th Qtr. FY 1981
Phase C: 3rd Qtr. FY 1981

3a. Date physical construction starts:
Phase A: 4th Qtr. FY 1979
Phase B: 2nd Qtr. FY 1983
Phase C: 2nd Qtr. FY 1983

4. Date construction ends:
Phase A: 1st Qtr. FY 1982
Phase B: 4th Qtr. FY 1984
Phase C: 2nd Qtr. FY 1985

5. Previous cost estimate:
Date: 5/81 $36,000(a)

6. Current cost estimates:
Date: 3/82 $38,405(b)
Less: CP&D, PE&D 2,405
Net cost estimate: $36,000
Date: December 1982

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7. Financial schedule ($000)

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978	$4,000	$1,600	$1,600	$ 754
1979	3,400	5,800	5,800	2,203
1980	5,500	5,500	5,500	6,620
1981	5,000	5,000	5,000	2,544
1982	4,900	4,900	4,900	1,580
1983	5,000	5,000	5,000	7,434
1984	5,000	5,000	5,000	10,385
1985	3,200	3,200	3,200	4,480
1986				0

(a) This includes: $14,000,000 for Phase A and $14,000,000 for Phase B SPTF Modifications, and $8,000,000 for Phase C, SCTI Modifications.

(b) This includes: $1,000,000 for FY 1976 CP&D funds and $500,000 for FY 1975 CP&D funds, $500,000 for FY 1981 PE&D funds and $405,000 for FY 1982 PE&D funds; $12,400,000 for Phase A SPTF modifications; $14,000,000 for Phase B SPTF and CHCF modifications; and $9,600,000 for Phase C SCTI Modifications.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

8. Brief physical description of project

This project provides for the annual capital improvements to Energy Technology Engineering Center (ETEC) testing and support facilities to carry out presently identified requirements and those which will manifest themselves in the future. Needs identified up to now and covered in earlier submittals included capital improvements to the Sodium Pump Test Facility and the Component Handling and Cleaning Facility to permit testing of the Double Suction sodium pump (Phase A) and of the two-stage-primary and the intermediate pump test units (Phase B). An additional requirement (Phase C) for such improvements, currently identified, is to modify the SCTI to add economizing equipment to reduce projected fuel consumption during steam generator testing.

Phase A Modifications (SPTF)

The Sodium Pump Test Facility (SPTF) has been modified to permit testing of sodium pumps, flowmeters, and other components at a maximum flow compatible with the CRBRP double suction pump, and at temperatures up to 1080°F through the addition of a high flow loop (HFL) in parallel with the existing loop and through the addition of a second test stand. The SPTF feed and drain tanks will be used in conjunction with the existing 18-in. diameter loop for thermal transient testing. It will be possible to impose thermal transients during flow testing in the 3000 to 24,000 gallons-per-minute range. The existing sodium purification system is improved.

The new HFL and the second test stand structure are erected in an add-on building adjacent to the SPTF. The building is steel frame with metal siding and is about 37 ft x 104 ft x 79 ft high. The HFL building has no heating or air conditioning but is ventilated. The test stand structure is a heavy steel structure 30 ft x 34 ft x 54 ft high. Interconnecting piping between the HFL, the second test stand and the existing main flow loop penetrates the wall of the new structure. The control building is modified and expanded by 1800 sq. ft with air conditioning and raised floor. Development of a variable pressure reducing device (VPRD) to absorb the pressure developed by the test pumps was a related part of this project.

Phase B Modifications (SPTF)

Additional modifications will be made to the SPTF to permit testing of two-stage primary pump test unit, the intermediate pump test unit, flowmeters and other components to full flow at temperatures up to 1080°F by modifications, such as installation of an additional sodium pressure reducing valve, and by piping changes to allow imposing thermal transients during flow testing of these sodium pumps. The second test stand will be modified to accommodate the test units which follow the double action pump.

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

8. Brief physical description of project (contd.)

The Component Handling and Cleaning Facility (CHCF) adjacent to the SPTF is utilized for assembly, disassembly, cleaning and handling of the pumps being tested. It has been planned to modify the CHCF for assembly/disassembly of the test units which follow the double suction pump, provide a new cleaning tank with an appropriate system for cleaning of sodium-coated equipment, and provide the required handling capability. Provisions will be made to accommodate the modified pump power requirements.

Phase C Modification (SCTI)

The SCTI will be modified by adding economizing equipment to reduce projected fuel consumption during steam generator testing. A Clinch River Breeder Reactor (CRBR) prototype steam generator unit would be reinstalled in a second test position to operate as an economizer by returning heat from the steam condensing loop to the sodium loop which is powered by two oil or gas fired heaters. The project consists of adding the sodium system piping, steam system piping, instrumentation and controls, a sodium drain tank, preheat and insulation, structure for the second test position, and building extension needed to install, house and connect the economizer unit.

9. Justification of need and scope of project

Testing and support facilities are required to carry out the assigned tasks of ETEC in the development and testing of components and systems in support of the breeder reactor and of other energy programs. These needs are not completely identified at any one point in time, but are constantly being added to, deleted from or modified, as the programmatic requirements become identified or further defined.

In scoping the modifications to the ETEC facilities, input is obtained from potential industrial vendors of components to be tested and from other elements of the component development efforts of the LMFBR program.

The current activities funded under the ETEC Facility Modification Project focus on improving the capability of the SPTF. The modifications are required to test the Clinch River Breeder Reactor Plant (CRBRP) double suction pump and then to accomplish additional modifications to be able to accommodate the test units which will follow the CRBRP pump. Scheduling of the Phase A SPTF facility modifications was keyed to the planned delivery of the CRBRP double suction pump, and Phase B modifications are keyed to the planned delivery of the two-stage primary pump test unit.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project:	Energy Technology Engineering Center Facility Modifications Energy Technology Engineering Center Santa Susana, California	2. Project No.:	78-6-e

9. Justification of need and scope of project (contd.)

Changes are also required to the CHCF to provide for handling and cleaning of the primary and intermediate pump test units. The components of these pumps require changes to the assembly/disassembly stand for the pump internals.

The SCTI modifications are needed in order to reduce operating costs and to save energy during future ETEC SCTI steam generator testing. Analysis of the 70 Mwt SCTI steam generator test program histogram indicates that an average of nearly 5 million gallons per year of fuel oil will be required for the first 4 years of testing on the 70 Mwt steam generator models . Conservative analysis of the SCTI system with an economizer installed indicates than an average of 2.5 million gallons of oil per year can be saved. Based on present worth a savings to investment ratio (SIR) of 4.44 is realized based on a 15 year period. The simple payback period is 3.11 years. Similar results are obtained if natural gas is burned as the energy source. The CRBRP prototype steam generator that will be reinstalled as an economizer will be obtained at no cost to the project. The CRBRP unit was manufactured and is being tested for DOE in a development program, and is not intended for other use.

10. Details of cost estimate (whole dollars)

	Item Cost	Total Cost
Phase A		
Engineering, design, and inspection		3,980,000
Title I	911,000	
Title II	1,665,000	
Title III	1,165,000	
Quick Turnaround	239,000	

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

10. Details of cost estimate (contd.)

Phase A (contd.)

	Item Cost		Total Cost
Construction costs			7,304,000
Improvements to land		0	
Buildings		1,640,000	
Other structures		394,000	
Control room mod.	394,000		
Structural (inc. w/buildings)	0		
Special facilities		5,270,000	
Mechanical	1,883,000		
Insulation	288,000		
Electrical, instrumentation, and controls	3,099,000		
Painting	0		
Utilities		0	
Standard equipment			65,000
Removal cost, less salvage			281,000
Construction management			537,000
Procurement services			169,000
Subtotal			12,336,000
Contingency			64,000
Total			$12,400,000

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

10. Details of cost estimate (contd.)

Phase B	Item Cost		Total Cost
Engineering, design, and inspection			3,140,000
Title I		440,000	
Title II		1,740,000	
Title III		960,000	
Construction costs			5,930,000
Improvements to land		0	
Buildings		0	
Other structures		440,000	
Special facilities		5,490,000	
Components	1,360,000		
Insulation	240,000		
Electrical, instrumentation, and controls	1,360,000		
Pipe, fittings, supports	2,350,000		
Valves	180,000		
Painting	0		
Utilities		0	
Standard equipment			0
Removal cost, less salvage			555,000
Construction management			650,000
Procurement services			250,000
Subtotal			10,525,000
Contingency (at 34% of total costs)			3,475,000
Total			$14,000,000

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

10. Details of cost estimate (contd.)	Item Cost		Total Cost
Phase C			
Engineering, design, and inspection			1,880,000
Title I		310,000	
Title II		970,000	
Title III		600,000	
Construction costs			5,960,000
Improvements to land		0	
Buildings		1,070,000	
Other structures		0	
Special facilities		4,890,000	
Long lead procurements	1,140,000		
Civil/structural	Incl. in blgs.		
Electrical, instrumentation, and controls	780,000		
Insulation	330,000		
Mechanical	2,480,000		
Refurbishment	160,000		
Utilities		0	
Standard equipment			0
Removal costs less salvage			0
Construction management			470,000
Procurement services			110,000
Subtotal			8,420,000
Contingency allowance (apprx. 25% of $8,110,000)			2,085,000 (c)
Total			$10,505,000 (d)

(c) Excludes contingency for Title I design.

(d) Includes $905,000 PE&D funding for Title I and Partial Title II, $500,000 for GFY 1981 and $405,000 for GFY 1982.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

11. Method of performance

Design of the facility modifications, procurement of major components, and management of the construction contracts will be by ETEC. Procurement and construction will be contracted on a fixed price basis.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding							
1. Total facility costs							
a) Construction line item							
Phase A	$ 9,577	$ 2,492	$ 331	$ 0	$ 0	$ 0	$12,400
Phase B	0	52	1,249	5,999	4,567	2,133	14,000
Phase C	0	0	0	1,435	5,818	2,347	9,600
S/T line item	9,577	2,544	1,580	7,434	10,385	4,480	36,000
b) CP&D	1,500	0	0	0	0	0	1,500
c) PE&D	0	135	700	70	0	0	905
d) Expense funded equipment	0	0	0	0	0	0	0
e) Inventories	0	0	0	0	0	0	0
Total facility costs	11,077	2,679	2,280	7,504	10,385	4,480	38,405
2. Other project funding							
a) R&D necessary to complete construction	2,659	0	0	0	0	0	2,659
b) Other project-related costs	5,438	1,089	2,024	2,364	3,570	350	14,835(e)
Total other project funding	8,097	1,089	2,024	2,364	3,570	350	17,494
Total project funding	$19,174	$ 3,768	$ 4,304	$ 9,868	$13,955	$ 4,830	55,899

(e) Includes $880,000 for a feed tank funded by reactor modification funding and $551,000, sodium cooler, general equipment; $5,384,000 double suction pump installation package, operating funded; $7,665,000 for two-stage primary pump installation, operating funded; and $355,000, electrical substation, operating funded.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Total facility cost
      a) Construction line item
         Indicated costs for Phase A are actual costs plus an estimated $26,000 necessary to complete the as-built drawings. Phase B costs are based upon the now completed Title I design. This estimate was escalated at a 12 percent rate to a construction midpoint of October 1983. The Phase C estimate is based on escalation of 8 percent per year for engineering, design, and inspection, and 12 percent for construction.

      b) CP&D
         No narrative required.

      c) PE&D
         No narrative required.

      d) Expense funded equipment
         Not applicable.

      e) Inventories
         Not applicable.

   2. Other project funding
      a) R&D necessary to complete construction
         Costs include prior year conceptual design costs ($1,209,000) and development and test of pressure reducing devices ($355,000 in FY 1977, $75,000 in FY 1978, $470,000 in FY 1979, and $550,000 in FY 1980).

      b) Other project-related funding
         Phases A & B
         Installation of the CRBRP pump test articles required the design, procurement, and installation of the double suction pump installation package at SPTF. In the CHCF adapters on the cleaning tank

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications
Energy Technology Engineering Center
Santa Susana, California

2. Project No.: 78-6-e

13. Narrative explanation of total project funding and other related funding requirements (contd.)

together with bagging equipment for isolation of the pump internals during handling operations were provided.

Installation of the two-stage primary pump test article will require the design, procurement, and installation of the pump installation package at SPTF.

Phase C
No other project related fundings are required.

c) Total related funding requirement
The facility will be used for its programmatic purpose for approximately 15 years from the time it is completed.

FY 1984 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

3. Date A-E work initiated: 4th Qtr. FY 1978

3a. Date physical construction starts: 3rd Qtr. FY 1979

4. Date construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate: $ 44,300
Date: December 1980

6. Current cost estimate: $ 45,300
Less amount for CP&D: 1,000[a/]
Net cost estimate: $ 44,300
Date: December 1982

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
TREAT Upgrade (TU) Project				
1978	$ 20,100	$ 14,050	$ 13,050	$ 183
1979	0[b/]	4,000	1,802	4,332
1980	5,950[b/]	8,000	8,021	7,158
1981	150[b/]	150	3,150	10,285
1982	18,100	8,000	8,000	6,040
1983	0	9,000	9,177	9,000
1984	0	1,100	1,100	1,900
1985	0	0	0	5,402

[a/] Includes $200,000 of FY 1975 and $800,000 of FY 1976 CP&D funds.
[b/] No authorization bill passed in FY 1980 and FY 1981. Amount shown reflects authorization required for this project to cover appropriations received as of that date.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

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8. Brief physical description of project

TREAT Upgrade (TU) Project

This project provides for the construction of modified facilities at the existing TREAT facility at the Idaho National Engineering Laboratory (INEL), Idaho, required to accommodate larger safety experiments in a more prototypic fast reactor environment. The facility modifications consist of enlarging the metal covered insulated high bay reactor building by raising the building ceiling 13.2 meters (43.2 feet) and the extension of three column spans (18.3 meters) to provide space necessary in support of experiments with the Advanced TREAT Loop (ATL). The high bay area will be serviced by a 60-ton crane. The metal covered insulated low bay portion of the reactor building will be expanded by 550 meters^2 to accommodate the additional electrical, mechanical, and experiment equipment required. Modifications to the reactor include replacement of the central region fuel assemblies by modified assemblies to improve the experiment performance capability of the reactor consistent with the needs of the experiments to be performed with the ATL. Structural modifications will be made to the rotating shield plug and upper shields, and a new grid plate and grid plate adapter will be provided. Included also are the design of the first ATL and ATL support systems and the design and fabrication of the TREAT support equipment necessary to assemble ATL's in the modified high bay and to remove primary vessels from the secondary vessels after an experiment prior to transportation of the ATL to the Hot Fuel Examination Facility (HFEF)-North for final disassembly.

9. Purpose, justification of need for, and scope of project

This project will provide new facilities with advanced capability to perform fast reactor safety research experiments. The current view of fast reactor safety program in-pile testing needs requires testing capability beyond that available in existing facilities. The fast reactor safety program is at a point now where it is crucial to proceed with the acquisition of these additional facilities in order to assure that safety research and development keeps pace with the needs of the national program of breeder power reactor development.

The TU project will result in an upgraded facility and associated equipment which will provide improved capabilities and greater flexibility for conducting nuclear reactor safety research experiments under transient conditions. The unmodified facility is limited to the performance of experiments containing a maximum of 7 fuel pins. The improved transient testing capabilities will include: (1) tests of fuel bundles to failure in a prototypic large reactor environment, including various neutron spectra with liquid metal cooling, (2) tests to failure of prototypic large reactor fuel bundles with up to 37 of the 6.86 millimeters (0.270 inch) fuel pins.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project:	Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho	2. Project No.:	78-6-c

9. Purpose, justification of need for, and scope of project (contd.)

These transient testing capabilities, particularly the fast reactor environment, are not available in any existing reactor test facility and are essential to obtain the experimental data required to address large reactor safety issues. It is imperative that the failure modes associated with the currently hypothesized reactor core disruptive accidents be understood and available for use in the design of and safety analyses for large reactors. The fast reactor safety program is at a point now where it is essential to extend the in-pile testing capability to accommodate larger test assemblies and to provide this capability at an early date.

Nuclear materials requirements for this project:

150 Kg U^{235} 93% enriched.

10. Details of cost estimate:[c]

	Item Cost	Total Cost
a. Engineering at approximately 99% of construction cost, item b.[d]		$ 20,900
b. Construction costs		21,100
(1) TREAT building and site modifications	$ 7,400	
(2) Reactor system modifications	4,700	
(3) Modified reactor fuel assemblies	6,800	
(4) ATL long lead materials	300	
(5) TREAT support equipment	1,900	
Subtotal		42,000
c. Contingency at about 11% of uncosted balance		2,300
Total TREAT Upgrade project cost		$ 44,300

11. Method of performance

To the extent feasible, design, fabrication, procurement, construction and installation will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

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[c] Cost estimate based on partially completed Title II Design.

[d] Project management, safety, and indirect costs have been pro-rated to both construction and engineering.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	Future Years	Total
a. Total Project Funding						
1. Total Facility Costs						
a) Construction Line Item TREAT Upgrade	$21,958	$ 6,040	$ 9,000	$ 1,900	$5,402	$44,300
b) CP&D	1,000	0	0	0	0	1,000
Total Facility Costs	22,958	6,040	9,000	1,900	5,402	45,300
2. Other Project Funding[e]						
a) Other project related costs						
TREAT Upgrade	6,100	2,000	2,300	3,200	800	14,400
Total other project funding	6,100	2,000	2,300	3,200	800	14,400
Total Project Funding (Items 1 and 2) ...	$29,058	$ 8,040	$11,300	$ 5,100	$6,202	$59,700

b. Total related annual funding requirements	
1. Facility operating costs (TREAT Upgrade operation for the Breeder Reactor Safety Program)	$ 4,000
2. Programmatic operating expenses directly related to the facility	18,400
Total related annual funding requirements	$ 22,400

13. Narrative explanation of total project funding and other related funding requirements

a. Total Project Funding

1. Total facility

a) CP&D

The CP&D funds were used for refined concept designs, cost estimates, schedules, and preparation of work packages for preliminary design activities.

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[e] Safety test facility and support facility conceptual design costs of $9,160K prior to FY 1979 not included since they are not part of the TU Project.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho
2. Project No.: 78-6-c

13. Narrative explanation of total project funding and other related funding requirements (contd.)

The CP&D funding was also used for site characteristic studies, loop handling machine and transporter studies, and to verify the feasibility of connect/disconnect operations at the loop/reactor interface.

2. Other Project Funding
Other project related funding includes conceptual design and refinement, and research and development in support of design and construction.

b. Total Related Annual Funding Requirement

1. Facility operating costs
TREAT Upgrade operating cost for the Breeder Reactor safety program is estimated to be $4,000,000.

2. Programmatic operating expenses directly related to the facility
Annual programmatic operating funds of $12,400,000 are required to perform the in-pile safety experiment program in TREAT Upgrade at the peak assumed reference thru-put level, and $6,000,000 is required to carry out the TU related support operations.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Nuclear Waste Activities

For nuclear waste disposal activities to carry out purposes of Public Law 97-425, including the acquisition of real property or facility construction or expansion, $306,675,000, to remain available until expended, to be derived from the Nuclear Waste Fund. To the extent that balances in the fund are not sufficient to cover amounts available for obligation in this account, such obligations may be incurred and liquidated from receipts which become available for transfer from the fund.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

NUCLEAR WASTE DISPOSAL FUND

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5			1
ES-4			
ES-3			
ES-2			
ES-1			
SUBTOTAL			1
GS-18			
GS-17			
GS-16			
GS/GM-15			17
GS/GM-14			21
GS/GM-13			17
GS-12			8
GS-11			5
GS-10			
GS-9			
GS-8			
GS-7			3
GS-6			7
GS-5			5
GS-4			5
GS-3			
GS-2			
GS-1			
SUBTOTAL			88
UNGRADED			
TOTAL PERMANENT POSITIONS			89
UNFILLED POSITIONS, END OF YEAR			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR			89

Department of Energy
FY 1984 CONGRESSIONAL BUDGET SUBMISSION
LEAD TABLE
Nuclear
Nuclear Waste Fund
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983[A/] Appropriation	FY 1984 Base	FY 1984 Request	FY 1985[B/] Estimate	FY 1986[B/] Estimate
Nuclear Waste Fund (NE)						
Repository						
Operating expenses ...	$ 0	$191,897	$191,897	$267,300	$276,400	$325,400
Capital investments ..	0	13,500	13,500	12,500	12,800	14,800
Total	0	205,397	205,397	279,800	289,200	340,200
Federal/State Assistance						
Operating expenses ...	0	1,000	1,000	1,500	1,700	1,700
Monitored Retrievable Storage (MRS)						
Operating expenses ...	0	3,500	3,500	0[C/]	0[C/]	0[C/]
Program Management and Technical Support						
Operating expenses ...	0	7,228	7,228	25,375	28,700	28,700
Capital investments ..	0	200	200	0	0	0
Total	0	7,428	7,428	25,375	28,700	28,700
Total Obligations						
Operating expenses ...	0	203,625	203,625	294,175	306,800	355,800
Capital investments ..	0	13,700	13,700	12,500	12,800	14,800
Nuclear Waste Fund	0	217,325	217,325	306,675	319,600	370,600
Projected Revenue	(0)	(98,000)	(448,000)	(448,000)	(482,000)	(531,000)
Staffing FTP/Total FTE's	0	28/29	28/29	89/96	101/108	110/117

Authorization: Sec. 31, P.L. 83-703, P.L. 97-425

A/ Funding appropriated under FY 1983 Continuing Resolution for Energy Supply Research and Development Appropriation.

B/ The outyear estimates were developed before the Nuclear Waste Policy legislation was enacted. The Department is evaluating the impacts on the program and funding estimates.

C/ The Nuclear Waste Policy Act requires DOE to develop a proposal for MRS. The Department is evaluating the impacts on the program and funding estimates.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET SUBMISSION

SUMMARY OF CHANGES
Nuclear Waste Fund
(Dollars in Thousands)

FY 1983 Appropriation enacted			$217,325
Built in increases and decreases			0
FY 1984 Base			217,325
Program increases and decreases:			
Repository			
Operating			+ 75,403
Basalt		+ 1,800	
o Complete drilling, lining, and outfitting of exploratory shaft	- 900		
o Conduct repository sealing R&D, equipment/instrumentation R&D, facility design, and data base collection efforts and required waste package design, and materials testing	+ 2,700		
Tuff		+ 23,600	
o Complete examination, lining, and outfitting of exploratory shaft	+ 13,700		
o Conduct site characterization and field testing in support of licensing	+ 5,800		
o Provide systems analysis, and regulatory/institutional support for licensing	+ 3,310		
o Conduct required waste package design, and materials testing	+ 790		
Salt		+ 45,203	
o Integrate waste package design and fabrication techniques tailored to prime salt site	+ 5,100		
o Continued site characterization of prime salt site	+ 5,543		
o Focus repository development and design on primary salt site and integrate with exploratory shaft findings	+ 1,800		
o Begin construction of exploratory shaft in primary salt site	+ 24,000		
o Acquire land to protect primary site for repository	+ 7,800		
o Provide Rock mechanics tests and facilities, regulatory and other studies	+ 960		
Other media		+ 4,800	
Initiates field studies in selected areas.			
Capital investments			- 1,000
Completes FY 1983 major equipment procurements for outfitting the exploratory shafts.			

SUMMARY OF CHANGES
(continued)

Federal/State assistance		
Operating expense		+ 500
o Expand State participation in repository siting.		
Monitored retrievable storage		
Operating expense		- 3,500
Program management and technical support		
Operating expense		+ 18,147
o Expand analysis of supporting R&D focused on transportation requirements and other studies	+ 3,465	
o Transfer technology support effort from Generic R&D in Commercial Waste to Fund	+ 10,100	
o Provide additional Federal staff for fee mechanism and expanding siting program	+ 4,582	
Capital investments		- 200
FY 1984 Request		306,675

Nuclear Waste Fund - continued

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Nuclear Waste Fund	$217,325	$217,325	$306,675

The Nuclear Waste Policy Act of 1982, Public Law 97-425, established a Nuclear Waste Fund for the collection of receipts from utilities which pay for nuclear waste disposal services. The Act also provides for expenditures, subject to appropriation, for (1) disposal activities associated with mined geologic repositories and (2) study of monitored retrievable storage of waste. Prior to the Act, the waste activities were budgeted in the Commercial Nuclear Waste and Fuel Cycle decision units and appropriated in the Energy Supply Research and Development Activities appropriation. The revenue projected to be collected from utilities over the next 5 years to finance the Fund based upon a one mill per kilowatt hour fee are as follows:

Projected Annual Fees
(Dollars in Millions)

FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
$ 98*	$ 448	$ 482	$ 531	$ 591	$ 604

The Nuclear Waste Policy act's specific requirements related to disposal activities include: (1) to select the site for the first and second repositories by 1987 and 1990 respectively, with construction authorization to be issued by NRC by as early as 1990 and 1993 and (2) to carry out a comprehensive program of consultation and cooperation with States and affected Indian Tribes, including the provision of technical and financial assistance. Also the Secretary is authorized to construct a test and evaluation facility. In FY 1984 the Fund's budget requirements are $306,675,000 which represents a $89,350,000 or 41 percent increase over the FY 1983 budget. These increases are required to construct exploratory shafts at three candidate sites and continue a crystalline rock program. The Department is currently reviewing P.L. 97-425 for financial impacts on the FY 1984 request and out year estimates.

The budget justification for the Fund is subdivided into (A) Repository, (B) Federal/State assistance, (C) Monitored Retrievable Storage (MRS), and (D) Program Management and Technical Support. Each of these activities is discussed in the following narrative.

A. Repository	$205,397	$205,397	$279,800

The major objective of the repository activities is to dispose of commercial high level waste and spent fuel in an environmentally acceptable and safe manner.

The Department is currently considering salt (both bedded and dome), basalt and volcanic tuff, as potential host rocks for a repository. The geologic and hydrologic investigations in these potential host rocks are in various stages of maturity, but are primarily focused on obtaining the necessary information in time to submit a license application for the first repository in early FY 1988. Site screening activities for other geologic media as potential host rocks for a second repository have begun.

Both the legislation and the NRC regulations (10 CFR 60) require the Department to characterize a minimum of three sites before selection of the first repository site and submittal of a license application. The Department has identified two specific sites for

*The FY 1983 projection assumes fees are collected starting in the fourth quarter of the fiscal year. If fee collection is deferred FY 1983 revenues will be reduced by approximately $29 million per month.

detailed characterization by exploratory shafts and at-depth testing. These two sites are in the basalt flows on the Hanford site in the State of Washington and in volcanic tuff near the Nevada Test Site. A third site in a salt formation (either bedded or dome) will be identified in FY 1983. Site Characterization Reports (SCR) for each candidate site will be prepared and submitted to NRC and the public. These reports will be updated with the results from constructing the three exploratory shafts and at-depth testing. Exploratory shaft construction will be completed in FY 1986. Following completion of detailed, at-depth examination of at least three sites in late FY 1987, the repository site will be chosen.

In parallel with the detailed site characterization studies, technology development is underway relative to waste package and the repository development. Because the various host rocks at candidate sites have markedly different geologic, hydrologic, chemical, and mechanical properties, waste package and repository designs must generally be tailored to these particular properties at the candidate site. Conceptual designs of waste packages have been prepared and detailed waste-package designs will be completed in FY 1984. Final waste-package designs will be completed in FY 1987 for inclusion in the license application.

Conceptual designs for a repository in each potential host rock are in preparation and will be completed in FY 1986 and incorporate data from testing from the exploratory shaft. A Title I design will be completed for inclusion in the license application for the selected repository site. To aid in the licensing and operation of a repository, P.L. 97-425 authorizes the Secretary to construct a test and evaluation facility (TEF). In FY 1983 a decision will be made on the need for this facility.

The repository activities consist of program elements by host rock i.e., basalt, tuff, salt, and other media. The operating expenses requested for each host rock is discussed in the following paragraphs.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Operating expenses	191,897	191,897	267,300
a. Basalt	58,000	58,000	59,800

The objective of Basalt Isolation (BWIP) Project is to determine the suitability of the basalt formations underlying the Hanford Site for a potential repository site and to develop supporting technology for this effort. Studies have been conducted since 1977 to characterize the geologic and hydrologic properties of the basalt. Although a number of technical issues have been identified and are being addressed, the site characterization efforts have not identified any impediments that would disqualify the Hanford site for a repository.

In FY 1982, major accomplishments in the project included: (1) selection of the location for the exploratory shaft, (2) completion of the principal borehole coring at the exploratory shaft site and initiation of geologic/hydrologic testing, (3) completion of the waste package conceptual design, (4) completion of the electric heater test program at the Near Surface Test Facility, and (5) completion of the repository conceptual design study.

The major FY 1983 efforts will be directed at the geologic and hydrologic evaluation of the basalt flows. An extensive field-work program has been underway centering on the 70-square-mile Cold Creek Syncline area within the Hanford site. The SCR was submitted to NRC during FY 1983. Tests from the confirmatory borehole will be completed in FY 1983 at the candidate site to provide input to the design of the exploratory shaft. Design and long-lead procurement for the shaft will be continued into FY 1983 to support the initiation of shaft construction in mid FY 1983. These activities will allow construction completion, and testing in the exploratory shaft by 1985. Surface-based activities, including testing in existing boreholes and drilling and testing in about three new deep boreholes, will be continued to characterize the near-field and regional geologic and hydrologic regimes, as well as the tectonic and seismic features of the site. Technology and engineering studies to develop the required waste package and repository designs will be continued. Development and application of specific performance assessment models will be continued in order to establish a basis for calculating site performance for licensing.

FY 1984 Planned Basalt Program activities .... $ 59,800

The siting, waste package, and repository development activities for Basalt planned for FY 1984 are as follows:

Siting

The exploratory shaft, which will provide access to the repository horizon for the purpose of in situ testing, will continue as the major basalt facility effort. Construction of the exploratory shaft will be completed including drilling, lining, and outfitting of the shaft. Initiation of mining the exploratory shaft station within the repository horizon and borehole testing along the length of the shaft will be started to confirm shaft liner sealing integrity and for core recovery, geophysical logging and hydrological geophysical testing of selected horizons. Planning and design of follow-on underground expansion needed for in-situ tests to determine site suitability will be conducted so construction for this testing can commence in early 1985.

Geologic characterization activities performed in FY 1983 will be continued in FY 1984 toward resolution of key site issues defined in the SCR. Results from geologic characterization activities will be documented in periodic updates to the SCR. Hydrologic characterization activities will involve drilling and testing in surface-based boreholes consistent with the "Drilling and Testing Plan," which identifies completion of drilling by September 1985 and completion of testing by September 1986. Data obtained will be documented and provided for periodic updates to the SCR. High-stress long-duration pump testing will continue through FY 1984 in the DC-16 cluster boreholes to provide crucial vertical hydrologic conductivity data and other hydrologic data over a relatively large area as required by NRC. Coring and testing will be initiated in one new deep hole (DC-18) to assess a potential localized discharge to the Columbia River in the Gable Mountain area. Testing will be completed at the McGee Well to study a potential subsurface hydrologic flow barrier and at the DC-7&8 and DC-4&5 paired boreholes to help complete the regional hydrologic model. Some other previously drilled holes will be cleaned out, tested, and continually monitored. As input to the license application, environmental characterization and socioeconomic evaluations will continue, and the radiological and ecological surveys of the candidate repository site will be completed.

Development of the performance assessment models for a basalt repository needed to assure the required containment and isolation capabilities of the site will continue in FY 1984, with benchmarking for validation purposes well underway. DOE will conduct performance analysis using information resulting from the evolving exploratory shaft site characteristics, repository design, and waste package design activities to support the overall site performance assessment effort. Also, work in the areas of configuration management, system specifications, and technical baseline efforts will continue to assure a well-planned and coordinated project.

Nuclear Waste Fund - continued

Waste Package

Qualification of waste package materials and development of waste package design requirements will continue with major input provided from hydrothermal hot cell testing. These efforts will result in the issuance of upgraded waste package conceptual designs for commercial high level and transuranic waste, spent fuel and defense high level waste by the end of FY 1984. Waste package design fabrication testing will continue to provide input into the evolving design efforts. Sorption-desorption studies of waste-package-tailored backfill materials will also be initiated as part of the material qualification effort. A report documenting the properties of potential backfill materials will be issued along with quantification of component performance to support repository design.

Repository Development

The repository functional design criteria will be updated in FY 1984 to support the start of a site-specific upgraded conceptual design in FY 1985. This upgraded design will be the design basis for determining site suitability. Data obtained from drilling the exploratory shaft previously completed, repository studies, and rock mechanics small-scale tests will be incorporated into the repository data base. Rock mechanics laboratory tests will continue to provide required rock mechanics and thermal properties data, as well as initiation of small-scale field tests at the Near Surface Test Facility to support follow-on exploratory shaft testing. Development studies will continue on equipment and instrumentation based on development and design requirements previously established. Preliminary designs for field testing of hard-rock mining equipment will be initiated. Borehole sealing material studies will continue, while plans for repository seal field testing will be developed and specifications to support start of field testing in late CY 1984 will be prepared. Engineering studies will continue in FY 1984 to evaluate and update ongoing basalt repository design efforts.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
b. Tuff	$ 56,600	$ 56,600	$ 80,200

The objective of Nevada Nuclear Waste Storage Investigations (NNWSI) is to determine if the Nevada Test Site (NTS) contains a suitable location for a deep-mined repository for commercial nuclear waste and to develop supporting technology for this effort. Intensive studies have been conducted since 1977 to determine the geologic and hydrologic setting of the NTS and surrounding areas. Site characterization activities began focusing on tuff formations underlying Yucca Mountain in 1979. Although a number of technical issues have been identified and addressed, the site characterization efforts have not identified any impediments or flaws that would disqualify Yucca Mountain for a repository.

Several significant accomplishments were realized in FY 1982. These accomplishments included preliminary analyses of ground-water travel times and the potential for volcanism at NTS; the completion of conceptual designs of waste packages for a saturated-zone repository and the initiation of corrosion testing; and the drilling and testing of multiple boreholes to acquire exploratory and geotechnical data. Other accomplishments included the completion of preliminary thermal- and mechanical-properties testing for four potential repository horizons; the initiation of repository designs for several horizons; and initiation of planning for borehole/shaft sealing.

Important accomplishments planned in FY 1983 include the selection of the unsaturated zone as an emplacement environment and the location of the exploratory shaft. The Site Characterization Report which is both a regulatory and legislative requirement, will be prepared. A land use agreement among the Department, the Air Force, and Bureau of Land Management will be reached. The environmental documents necessary to authorizing the start of shaft construction will be prepared. The surface- and borehole-based geologic, hydrologic, geochemical and geophysical studies will also be continued. Waste package designs, tailored to the oxidizing but relatively dry environment expected in the unsaturated zone, will be initiated; conceptual designs for a full-scale repository also will be initiated. Work will be continued on the development of computer codes that describe the performance of a repository in the unsaturated zone. Finally, work will be continued on site preparations and procurements to allow exploratory shaft construction to begin in early FY 1984.

FY 1984 Planned Tuff Program activities .... $ 80,200

The siting, waste package and repository development activities for Tuff planned for FY 1984, are as follows:

Siting

The NNWSI program efforts will emphasize the start and completion of an exploratory shaft to the reference repository horizon. The shaft will be mined conventionally to allow detailed examination and measurement of crucial geologic and hydrologic parameters, including the natural moisture flux, permeabilities, and groundwater age and chemistry. Horizontal borings will be cored to evaluate the lateral distribution of hydrologic, thermal, and mechanical properties in the repository horizon.

Additional site-related studies will focus on defining the spatial distribution of sorptive materials in at least two horizons, the drilling and testing of several new boreholes to determine the natural moisture flux, the physics of flow in the unsaturated zone, and the in-situ stress. Work will be completed on weapons-effects seismic studies and volcanism studies. Other regional hydrologic studies will also begin to help put the more-detailed, local hydrologic models in proper perspective.

Also, work will continue on the development and refinement of models that provide quantitative information on the impact of a repository at Yucca Mountain. Important models describing flow and transport of radionuclides in unsaturated, fractured rock, not attempted before will be investigated. The development of a computerized data base, containing the qualified geological and engineering data, will be continued and maintained in FY 1984 to aid the quality assurance program. A site-specific systems description delineating functional requirements, performance measures, performance criteria and constraints, will be completed.

Waste package

In the waste package area, laboratory testing of potential components of a waste package will continue, trying to identify viable materials and degradation mechanisms to predict component lifetimes. A decision on the need for special backfill materials which can be quite costly and may be superfluous in a dry environment will be made in FY 1984. The preliminary design of a waste package, consistent with the properties of the host rock and the design of the repository, will be completed. Work on the development of computer codes to describe waste package failure and the potential release of radionuclides into the unsaturated zone will continue.

Repository development

The repository data-base activity will involve the measurement of physical and mechanical properties of the tuffaceous rocks, engineering analysis of the underground workings, and the conduct of large-scale rock-mechanics tests to determine the effects of heat on the rock mass. This data-base activity will be used in repository design, and in making predictions of the strength of the rock mass and of

Nuclear Waste Fund - continued

the effects of heat on the local hydrology. The conceptual design for a repository in the unsaturated zone will be completed in FY 1984. Instrumentation for long-term monitoring activities will be developed in FY 1984. The functional requirement seals for boreholes, shafts, and underground openings in the unsaturated-zone will be determined.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
c. Salt	$ 67,597	$ 67,597	$112,800

The objective of this project is to conduct site characterization efforts in bedded and domed salt and to undertake specific technology development activities to nominate at least three salt candidate sites by mid-1983 and to characterize at least one site for repository selection by 1987. Longer term studies will continue for a second repository site selection by 1990.

In FY 1982, the Department continued to study the Gulf Interior Region salt domes in Mississippi and Louisiana as well as the bedded salt formations of the Paradox Basin in Utah and the Palo Duro portion of the Permian Basin in Texas. Tests continued on cores extracted from drillholes at salt sites and more complete information was compiled on the behavior of salt under potential repository conditions. Tests at the Avery Island dome were completed and an analogous test program for testing the behavior of bedded salt was developed. Waste package design and repository system integration studies also continued in FY 1982.

In FY 1983, three candidate salt sites were nominated with a primary salt site selected. Longer range studies were continued on potential sites for regional repositories. Surface-based activities were continued to characterize the near-field and regional geologic and hydrologic regimes, as well as the tectonic features of the selected site. Safety assessment and environmental documents, and a SCR were prepared to support the exploratory shaft activity in salt. Thermo-mechanical analyses and modeling, and collection of data concerning geochemical properties of salt were continued to provide a better understanding of the phenomena affecting long-term repository performance. Application of specific performance assessment models were accomplished to establish a basis for licensing. The Department continued information exchanges with regulatory agencies to support development of licensing for calculating requirements and documentation leading to the submission of a license application for the first repository. In FY 1983 preliminary designs of required long-life multi-barrier waste package systems for salt were developed. Laboratory and engineering-scale testing of these waste package systems were initiated. Work on barrier-waste-rock interactions for salt to determine performance of candidate waste packages were continued.

FY 1984 Planned Salt Program Activities $112,800

The siting, waste package, and repository development activities for salt planned for FY 1984 are as follows:

Siting

Detailed site characterization at the prime salt site will continue including construction of the exploratory shaft. Several stratigraphic and hydrologic holes will be drilled, and extensive near-shaft and regional hydrologic testing will be started to better characterize the geologic and hydrologic properties of the site and overall geologic system. This information will enable better prediction of repository site performance and will help determine land acquisition requirements based on EPA release rate standards. Stratigraphic holes will be drilled and cored to evaluate rock properties and lateral extent. Hydrologic holes will be drilled, cored and pump tested to determine flow paths and flow rates essential to developing accurate, predictive hydrologic models and to examine the potential for any groundwater entry into the repository. Salt dissolution studies of the primary salt site region will continue, where appropriate, to determine the extent to which dissolution of the host rock could affect repository selection and performance. Seismic, micro-seismic and downhole monitoring and geologic mapping will be conducted to better understand the geologic structure of the salt sites. The possible occurrence of site oil and gas traps will be examined. Environmental and socioeconomic impact analyses will be conducted for the prime site. Site-specific studies of simple, natural chemical systems at the prime salt site and geochemical modeling development will continue for a better understanding of natural barrier performance.

The initial salt SCR will be updated and submitted to NRC to include progress and results of site characterization, waste form and packaging work, research and development efforts, and repository design.

The exploratory shaft test plans for salt will be completed. Site preparation work and actual construction of the exploratory shaft in salt will begin. Since the salt site will be on non-DOE land, site preparation activities will be necessary to include construction of roads, grading the site, drilling wells or piping water to the site, installing utilities and other similar activities. These activities will be funded with operating funds as they are temporary improvements to non-DOE land and will be removed after the site characterization activities are completed, assuming the site is not selected for the repository. Exploratory shaft construction will include drilling and lining of the shaft and surface-facility construction. If the exploratory shaft is located on private lands, land leases will be obtained for exploratory shaft access and land protection will be provided. For non-DOE public lands, appropriate interaction with the Bureau of Land Management will be implemented. Studies to determine appropriate programs to mitigate adverse economic impacts on States and local communities that may result from the repository will be more focused for the primary site.

Waste Package

Field tests are planned for potential waste package materials. Various waste-package emplacement approaches will be evaluated based on design and trade-off analysis. Spent fuel waste form leaching tests will continue under expected repository conditions, as will waste-package barrier-materials qualification testing to understand the behavior of potential barrier materials for development for actual use in a repository. Package design studies for spent fuel, high-level waste, and transuranic waste will continue.

Repository Development

The repository conceptual design activities for the selected Salt site will be continued. Engineering analysis of the upgraded conceptual design will be initiated. The preliminary analyses of a variety of design options and the thermal-mechanical-hydrologic data base for input to the upgraded conceptual design will be completed. The updated repository system description and the conceptual design of a sealing system for a salt repository will be completed and field testing will be initiated. Waste-packaging-facility design studies will be conducted in support of the repository development task.

Nuclear Waste Fund - continued

The engineering data base will be maintained to revise the SCR and develop licensing documents. Interaction with NRC and efforts to provide licensing guidance and interpretation to technical participants will be intensified. The international cooperative test program at the Asse salt mine in Federal Republic of Germany will continue to utilize the knowledge gained from operating that facility where transferable to operation of a high level waste repository.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
d. Other media	$ 9,700	$ 9,700	$ 14,500

The objective of this project is to perform characterization efforts in crystalline rocks and other possible candidate rock types and to undertake specific technology development work for a second repository to be selected by 1990.

In FY 1983, the nationwide screening for additional sites in other rock types necessary for a system of regionally based repositories was continued as a long term project. The characterization activities of crystalline rocks of the Lake Superior region and Northern and Southern Appalachians included continued identification of distinct clean zones within potential outcroppings or plutons of crystalline rock. Identification of these clean zones will be performed primarily using literature surveys and conventional surface exploratory techniques.

FY 1984 Planned Other Media Program Activities .... $ 14,500

Regional phase literature studies on distinct plutons in the three regions of interest will be completed identifying 15 to 20 or more clean zones potentially favorable for more detailed screening. A recommendation report and characterization plan for the next phase of study will be issued. No field testing will be conducted. Screening will be continued utilizing available literature and surface characterization. Site selection of a crystalline rock candidate is anticipated if one region of plutons can be identified as more suitable than others as evidenced from the regional studies. If site screening proceeds in all regions of study, a suitable site could be determined. Studies to identify potential sites in formations of argillaceous rock will begin. More frequent contact with state agencies will result from the expanded crystalline rock site studies. The international cooperative programs in granite with the Nuclear Energy Agency project at Stripa, Sweden and at the Underground Research Laboratory in Canada will continue in FY 1984 to conduct tests in granitic rocks.

Repository capital investments .... $ 13,500 $ 13,500 $ 12,500

Capital investments are necessary to support the repository activities described under operating expenses. Procurement of equipment required for the exploratory shaft construction and testing efforts were initiated in late FY 1982 and FY 1983; specifically, long-lead procurement of electric-powered, mine hoist for each of the three shafts and casing installation tools. Total estimated cost for each new hoist is $1,400,000. The casing tools are required to install the shaft liners after the shafts have been excavated. The total estimated cost of the casing tool is $1,700,000. The majority of the FY 1984 capital equipment request is to complete the purchase of the major items of equipment and purchase of support equipment for the construction and operation of the exploratory shafts. Examples of shaft support equipment include: electric power transformers, communication systems, standby generators, ventilation blowers and cooling systems, sump pumps, head frames, and underground mining equipment. Also, the nonshaft equipment to be procured include laboratory equipment and instrumentation for thermal-mechanical testing, waste/rock interaction studies, and field equipment and instrumentation for geologic, hydrologic, and geophysical site investigations. Equipment for

Nuclear Waste Fund - continued

testing of mining--induced and waste-emplacement effects on the host rocks and surrounding hydrology will also be procured.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
B. Federal/State Assistance	1,000	1,000	1,500

The Nuclear Waste Policy Act requires the Department to consult and cooperate with States affected by repository siting and development while the Department carries out these activities.

The objective of the Federal/State Assistance activity is to provide financial assistance to the States to allow them to participate in the planning and implementation of the site characterization program for mined geologic repositories. States utilize these funds to review information, data and results from ongoing investigations, to conduct independent analysis of data generated and to conduct independent site-specific research characterization program for mined geologic repositories. States utilize these funds to review information, data and results from ongoing investigations, to conduct independent analysis of data generated and to conduct independent site-specific research to verify or contest Department results. Social and economic impacts resulting from a repository siting decision may be studied to aid the Department in planning impact mitigation programs. In FY 1982 eight grants were given to state agencies and institutions. The average award was $70,000 but the grants ranged from $20,000 to $170,000. In FY 1983 this assistance will continue. The increase in FY 1984 to $1,500,000 will allow larger grants with states where siting activities for the first repository site will be more advanced.

C. Monitored Retrievable Storage (MRS) ..	$ 3,500	$ 3,500	$ 0

This program is directed to develop a proposal for an MRS system to provide for the retention of high-level waste and spent fuel with the intent to recover such fuel or waste for reprocessing or disposal. A report to the Congress must be submitted by June 1985 that includes five alternative site-specific designs, cost information, and environmental data sufficient to allow congressional authorization to construct one or more MRS facilities.

In FY 1982, the MRS program principal activity was to compare two storage concepts, cask and drywell, and three siting strategies, colocated with a reprocessing facility, at a stand-alone facility and colocated with a repository. Three different storage requirements scenarios were considered to account for the potential inventories of spent fuel and/or high-level waste (HLW) that might require storage over time periods considered.

In FY 1983, under the continuing resolution, this activity would solicit new and/or innovative MRS storage concepts to compare with those concepts previously investigated. In addition, specific activities would be conducted to address institutional and technological constraints affecting the deployment of an MRS system, such as siting, transportation, licensing, safety and environmental considerations.

Because the Nuclear Waste Policy Act requires DOE to develop a proposal for MRS, the Department is evaluating the impacts of the legislation on the program and funding estimates.

Nuclear Waste Fund - continued

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
D. Program Management and Technical Support	$ 7,428[a]	$ 7,428	$ 25,375

The objective of this activity is to provide for the technical support necessary to technically integrate the program and to cover the costs of the federal employees who manage the disposal activities in the Nuclear Waste Fund. This activity is divided into technical support, supporting nongeneric R&D, and program management which are discussed in the following paragraphs.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
a. Technical Support	0	0	10,100

The technical support task provides funding for the program technical support contractor for the repository activities. Specific contractor tasks include providing technical assistance to DOE in: disposal fee calculation; monitoring milestones and cost; writing and reviewing safety assessments to support repository licensing; reviewing designs of shafts, surface facilities, and underground excavations for a repository; and coordinating the R&D for all of the total program.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
b. Supporting R&D	5,400[a]	5,400	8,665

The supporting R&D task supports the repository activity and provides for development of standard materials characterization methods, by the Material Characterization Center (MCC) conduct of transportation analysis for the disposal program, and maintenance of the Engine Maintenance Assembly and Disassembly (E-MAD) facility as a fuel storage facility for the program. In addition, special studies and support are performed which include mission planning and other studies necessary to the administration of the Fund activities.

In FY 1983 the MCC will focus on developing standard methods of measuring waste form release rate. The E-MAD Facility operating staff will be maintained. This facility will receive the spent fuel from the Climax Test Facility when the tests are completed in FY 1984. Design requirements for a high-level waste shipping cask will be studied.

In FY 1984 the MCC will focus on developing standard methods for measuring the metal corrosion rates used in quantifying waste package performance. The spent fuel in the Climax Test Facility will be transferred to the E-MAD facility. The fuel will be stored there until it is used in other waste management test projects or facilities. The development and analysis of the disposal transportation system will continue with emphasis on design concepts and evaluation of industrial capabilities.

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
c. Program Management	2,028	2,028	6,610

The fund management task provides for salaries, benefits, and travel expenses for 96 full time equivalent (FTE) Federal positions associated with the financial management of the fund and the technical management of the repository and monitored retrievable storage. The budget covers employee salaries, overtime, incentive awards, severance pay, benefits and the travel directly related to program accomplishment. The travel expenses include both headquarters and dedicated field office personnel who support the Nuclear Waste Fund activities. The budget level requested provides for the normal increased personnel costs over the FY 1983 level, such as within-grade increases, promotions, etc., and allows for some increase in travel expenses consistent with the emphasis placed on decentralized management of program activities.

[a] Includes $200,000 of capital equipment used to purchase material test instruments for the material characterization center.

Nuclear Waste Fund - continued

The increase from 29 FTE's in FY 1983 to 96 in FY 1984 is required to implement the provisions in the Waste Policy Act of 1982, PL 97-425. The passage of the waste management legislation creates a national policy for interim and long-term storage of commercial nuclear waste and establishes added program requirements which have an immediate impact on the staffing levels of the program. These added requirements include management of a disposal fund, intensified repository development efforts, and planning for monitored retrievable storage. A number of functional activities associated with the added program requirements are the basis behind the need for increased staffing. These functional activities are as follows: policy determination, fund management, site screening and characterization, preliminary and final site selection, exploratory shaft development, regulatory, state and local interface, technology development, repository design, construction, and land acquisition. The existing staff allocation of 29 FTE's is insufficient to provide the technical and administrative management necessary to accomplish the goals of the legislated national program. An increase of 67 FTE's is required and requested for FY 1984.

Based on a recent Department study, the total long term manpower picture for the waste repository development and storage program is as follows: from 29 FTE's in FY 1983 to 96 FTE's in FY 1984 through a peak in FY 1992 of 224 FTE's and back to a level of 191 FTE's in FY 2000.

Specific reasons for additional staffing in FY 1984 are many; the most important include:

- starting in late FY 1983 or early FY 1984, the program's activities will be financed by fees collected from utilities. This change will require the full implementation of a fee collection function at Headquarters, that is, calculating fees, billing utilities, posting receipts, and auditing reactor generation data.
- the waste management legislation requires the program to characterize a site in granite which will require establishing a project office in the field and additional staffing at Headquarters. The legislation also calls for increased interaction between the Department, the NRC, the States, and requires Presidential approval of the repository site selection.

DOE/MA-0064/1
VOLUME 3 OF 7

CONGRESSIONAL BUDGET REQUEST

FY 1984

VOLUME 3

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

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DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	—	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	—	-3,331	—	-5,000	—	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	—	—	217,325	179,481	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	—	2,200	2,100	2,100
Special Foreign Currency	—	312	—	—	—	—
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,081	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	—	39,213	—	23,491	—	—
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY

Proposed Appropriation Language

[Energy Supply, Research and Development Activities,
Operating Expenses]

[Energy Supply, Research and Development Activities,
Plant and Capital Equipment]

Energy Supply, Research and Development Activities

For expenses of energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for energy supply, research and development activities and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 19 of which 16 are for replacement only) $2,094,645,000, to remain available until expended.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL.	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL.	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL.	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR . . .	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV	1	1	4
EXECUTIVE LEVEL V			
SUBTOTAL.	1	1	4
ES-6	1	1	2
ES-5	17	8	9
ES-4	39	40	42
ES-3	14	8	10
ES-2	14	15	14
ES-1	4	6	6
SUBTOTAL.	89	78	83
GS-18			
GS-17			
GS-16	1	1	
GS/GM-15	227	206	202
GS/GM-14	149	136	122
GS/GM-13	87	78	76
GS-12	56	45	55
GS-11	40	46	59
GS-10		1	5
GS-9	30	29	41
GS-8	30	26	23
GS-7	105	88	92
GS-6	120	101	97
GS-5	54	53	51
GS-4	25	26	12
GS-3	10	14	2
GS-2			
GS-1			
SUBTOTAL.	934	850	837
UNGRADED	6	6	5
TOTAL PERMANENT POSITIONS	1,030	935	929
UNFILLED POSITIONS, END OF YEAR . . .	15		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	1,015	935	929

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

DOLLARS IN THOUSANDS

	FY 1983	FY 1984
Appropriation	2,432,737	2,094,645
Comparative Transfer From:		
General Science	5,849	—
Departmental Administration	36,715	—
Uranium Enrichment	1,183	—
Comparative Transfers To:		
Nuclear Waste Disposal Fund	-217,325	—
Atomic Energy Defense Activities	-3,700	—
General Science	-12,767	—
Subtotal, Budget Authority	2,242,692	2,094,645
Unobligated Balances, Start of Year	94,206	123,813
Unobligated Balances, End of Year	-123,813	-124,009
Total Available for Obligation	2,213,085	2,094,449

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,651
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	190	168	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,330	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,120	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,670	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX EMERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,790
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,790

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Solar Energy	268,224	201,935	86,659
Geothermal	69,904	49,628	13,553
Hydropower	3,000	1,000	—
Electric Energy Systems	21,300	17,200	12,702
Energy Storage Systems	38,500	25,700	14,200
Nuclear	1,078,051	815,865	848,192
Environmental, Safety and Health ...	55,347	38,995	40,375
Biological and Environmental Research	211,977	188,220	170,200
Magnetic Fusion	451,231	447,062	467,000
Instrumentation Initiative	—	—	6,000
Basic Energy Sciences	241,183	282,850	350,170
Energy Research Oversight, Analysis, and University Research Support ...	15,299	11,427	11,739
Multi-Program Facilities	33,140	34,000	40,600
In-House Energy Management	23,600	16,000	14,400
Technical Information Center	15,826	15,253	14,100
Plant Engineering and Design	700	700	1,000
Policy and Management	5,360	5,750	3,755
Subtotal, Energy Supply R&D	2,532,642	2,151,585	2,094,645
Transfers from/to Other Accounts ...	-14,540	—	—
Undistributed	—	91,107	—
FY 1981 Deferrals	-142,335	—	—
Total, Energy Supply R&D............	2,375,767	2,242,692	2,094,645

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

ENVIRONMENT, SAFETY AND HEALTH

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Environment, Safety and Health

The goal of the Environment, Safety and Health program is to make certain that an effective system is maintained throughout the Department and its operations to:

- Assure protection of the environment, the safety and health of the public, and Government property, against accidental loss and damage.
- Provide safe and healthful workplaces and conditions of employment for all employees of DOE and DOE contractors
- Assure compliance with applicable statutory requirements affecting Federal facilities and operations and protect projects from interruptions or delays due to failure to observe environmental compliance, safety or health requirements or policies.
- Assure that research, development, demonstration, and production activities are designed, developed, constructed, tested, operated and maintained according to sound engineering standards, quality practices, and technical specifications, and that resulting technology data are valid and retrievable.

As its principal basis in law, the Environment, Safety and Health Program responds directly to the following statutory requirements:

- PL 79-585, Atomic Energy Act of 1946, authorizes research and development for medical, biological and health purposes and for protection of health and promotion of safety during research and production activities using fissionable and radioactive materials.
- PL 83-703, Atomic Energy Act of 1954, exempts DOE (AEC) contractors from licensing requirements, requires maintenance of health and safety and preservation and enhancement of a viable environment during research and production.
- PL 91-956, Occupational Safety and Health Act of 1970, exempts certain Government-owned, contractor-operated, workplaces and permits agencies to prescribe and enforce occupational health and safety standards.
- PL 91-190, National Environmental Policy Act of 1969, requires consideration of environmental factors in agency decision-making and preparation of environmental impact statements as required.

It is also a program goal, based upon the language of the Department of Energy Organization Act of 1977, to assure that the energy impacts of current and proposed environmental requirements are compatible with National energy goals and conversely, that Federal environmental decisions reflect National energy goals.

While most of these stated goals have historically been the basis for effort in the Environment, Safety and Health program, the principal focus of activity has been recently sharpened to more strongly emphasize environmental protection, safety, health protection and quality assurance in Department of Energy operations. The Department's nuclear energy and defense programs have received particular attention. The refocusing began as a result of a Departmental examination of safety lessons that could be learned from the Three Mile Island incident, and which could be applied to the operation of DOE nuclear facilities.

The program consists of five major units: Nuclear Safety, Operational Safety, Quality Assurance and Standards, Environmental Compliance, and Environmental Analysis. Their activities involve the development of policies and standards; oversight to monitor program and field office performance in complying with DOE policies and standards; technical assistance, as needed, to foster compliance; the review of National Environmental Policy Act documents, and the analysis of energy/environment issues.

The program is essential to the continued effective operations of the nuclear energy and defense programs of the Department of Energy.

Fiscal Year 1983 Accomplishments include:

Nuclear Safety and Operational Safety, jointly.

- o Conducted comprehensive environmental protection, safety and health protection appraisals of four Departmental Field Operations and developed plans for five Field Operations comprehensive appraisals and one Headquarters line organization management appraisal to be performed in Fiscal Year 1984. The comprehensive appraisals consist of performing appraisals in approximately ten functional areas in conjunction with, and as input to, a management appraisal of the organization being apraised.

Nuclear Safety

- o Developed guidance to define the scope and content of fundamentals training for operators of DOE reactors;
- o Developed evaluation criteria, methodology and procedures used to evaluate the adequacy of DOE reactor operators training programs;
- o Developed, documented, and verified a methodology for conducting job and task analyses for operating personnel at DOE reactors to improve the selection, qualification, and training requirements for reactor operators.
- o Provided technical expertise and assistance to field offices and line safety organizations in the review of safety analyses, interpretation and guidance on Departmental policy for environmental protection, safety, and health protection for nuclear facilities and operations, and appraisals of nuclear operations.
- o Initiated training courses for DOE and DOE-contractor supervisory and operating personnel in the areas of nuclear criticality safety fundamentals and controls, and nuclear accident prevention.
- o Initiated evaluation of existing and development of new methodologies for the assessment and implementation of nuclear criticality safety including evaluation of existing computer codes and development of information systems and resource data book.
- o Continued development of improved evaluation techniques for the mitigation of general classes of hazards faced by DOE nuclear operations.
- o Completed assessment of improved radiation measurement systems for possible DOE-wide application.

- Initiated extension of Atmospheric Release Advisory Capability (ARAC) to cover all DOE nuclear facilities, and continued coordination with Department of Defense for application of ARAC to nuclear weapons sites in the United States. Attained a 30 minute ARAC response at DOE and military sites for which preparations were completed in Fiscal Year 1982.

- Continued assistance to States and local governments in the development, review and exercise of emergency response plans; and participated in one multi-agency exercise to test the FEMA coordinated plan for Federal response to radiological emergencies.

Operational Safety

- Completed fire protection surveys at five DOE installations (Sandia National Laboratory in New Mexico, Mound Laboratory in Ohio, Kansas City Plant in Missouri, Brookhaven National Laboratory in New York, and Argonne National Laboratory's EBR-II reactor test facilities in Idaho), performed appraisals of all DOE aircraft operating contractors, and completed guidelines for optimum fire management systems.

- Completed a revised Industrial Hygiene chapter for the basic ES&H DOE Order 5480.1; established a Departmental policy for occupational carcinogens and a technical consultation service for toxic materials; and developed guides for field facility ventilation systems and construction safety.

- Presented eighteen Management Oversight Risk Tree (MORT) series seminars for ES&H personnel in DOE operations, introduced a new workshop on human factors in safety programs, and produced two state-of-the-art safety program guidelines.

- Continued medical care and radiological monitoring of Marshall Islands people; completed final reports for the Northern Marshall Islands Radiological Survey of Terrestrial Food Chain and Total Doses; and continued processing radiation dosimetry records at the Nevada Test Site.

- Completed comprehensive surveys and mobile gamma radiation surveys at several uranium mill tailings sites. Completed comprehensive surveys of two Formerly Utilized MED/AEC sites, a post-remedial action survey of vicinity property contamination, and the certification process for completed remedial activities. Completed post-remedial action surveys for a surplus DOE facility.

- Implemented an environmental data and compliance record system for DOE operations, a Departmental ground water monitoring system and related environmental protection activities.

Quality Assurance and Standards

- Completed a baseline quality assurance overview of principal DOE programs, and established quality assurance guidelines for major projects and systems acquisitions within the Department.

- Established a central computer file for unusual occurrence reports on events adversely affecting performance, reliability or safety of a DOE facility, and developed procedures for their analysis.

Environmental Compliance

- Completed 150-200 analyses of NEPA documentation requirements for Departmental defense, nuclear and research actions, and 120-140 independent reviews of NEPA documents prepared by DOE organizational units. Participated in the preparation of 60-70 such documents. These major Environmental Impact Statement reviews included the Pantex Facility Expansion, the Advanced Isotope Separation Module, the restart of the Purex facility, the development of a Nuclear Waste Management Exploratory Shaft in a

Salt Basin, and a number of Uranium Mill Tailings remedial action projects. Practical result of this work was to protect the Department's defense, nuclear, and research projects from delays due to non-compliance with the National Environmental Policy Act and other relevant requirements.

Environmental Analysis

- Analyzed energy-related costs and benefits of proposed changes to the Clean Air Act and Clean Water Act. Assessed the impacts on DOE facilities of proposed modifications to these Acts.
- Represented the Department on interagency and international work groups on acid rain and transboundary air pollution.
- Documented the costs and environmental benefits of the implementation of technology-based wastewater effluent standards and monitoring requirements throughout the energy industry. Documented similar costs related to new hazardous waste management requirements.
- Maintained the principal DOE environmental quality and control technology data base.

Specific Environment, Safety and Health program objectives for Fiscal Year 1984 are to:

- Develop training guidance for reactor and nuclear facility operators to improve operational safety at DOE nuclear facilities.
- Furnish technical guidance to field and program managers on nuclear facility safety.
- Maintain a viable radiological emergency response capability for DOE facilities, in coordination with the Federal Emergency Management Agency, which will be made available on request to other Federal and State authorities.
- Develop improved methods for internal radiation dose assessments, to assure compliance with radiation exposure limits recommended by National/International authorities. Develop an enhanced DOE-wide radiation exposure records program.
- Develop improved methodologies for assessing the safety of nuclear operations and implement nuclear facility safety programs.
- Issue revised environmental protection, safety and health protection guidance, as required for Departmental operations, and conduct appraisals of ES&H performance at each of the eight Operations Offices on a biennial basis.
- Issue quality assurance and unusual occurrence reporting guidance and appraise implementation of the guidance at eight field or program offices.
- Assist DOE organizational units in preparing sound NEPA documents for their actions, and perform reviews of all such required documents, so as to facilitate Departmental programs.

- Maintain health effects criteria development and oversight of the DOE Remedial Action Program, applicable to Uranium Mill Tailings sites, Formerly Utilized MED/AEC sites, and surplus DOE facilities.

- Perform analyses of proposed regulations and statutes, such as modifications to the Clean Air and Clean Water Acts, to ascertain expected DOE program impacts and to construct bases for corresponding Departmental policy decisions.

- Provide medical care and/or radiological monitoring of Marshall Islands people at Rongelap, Utirik, and Enewetak, and expand radiation exposure assessments at the Nevada Test Site.

Accomplishment of these specific objectives will: help assure Departmental compliance with environmental protection, safety and health protection laws and regulations, particularly at nuclear and defense programs installations; prevent unnecessary DOE program and project delays caused by environmental issues; ensure that a balance is struck between energy and environmental concerns in the formulation of broad national energy policy goals; foster the establishment and maintenance of effective quality assurance procedures and methods in all of the activities of the Department of Energy; and assure adequate protection of the public from current DOE activities, the results of past nuclear operations conducted by the government, and possible harm associated with radiological emergencies.

The following map and graphs show the diversity of DOE facilities around the United States which must implement environmental protection, safety and health protection, as well as statistical data on the quality of their compliance with these requirements in comparison with the compliance experience of industry:

Figure 1: Map of DOE Field Facilities and Operations

Figure 2: DOE and Contractor Recordable Injury Incidence Rates

Figure 3: DOE and Contractor Total Property Loss Rates

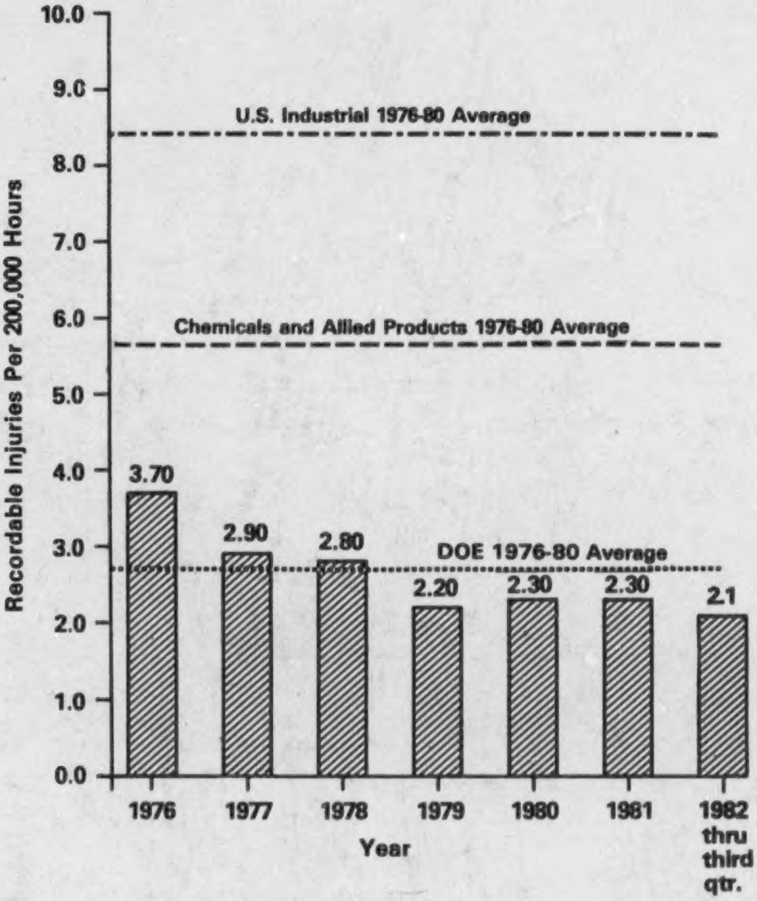
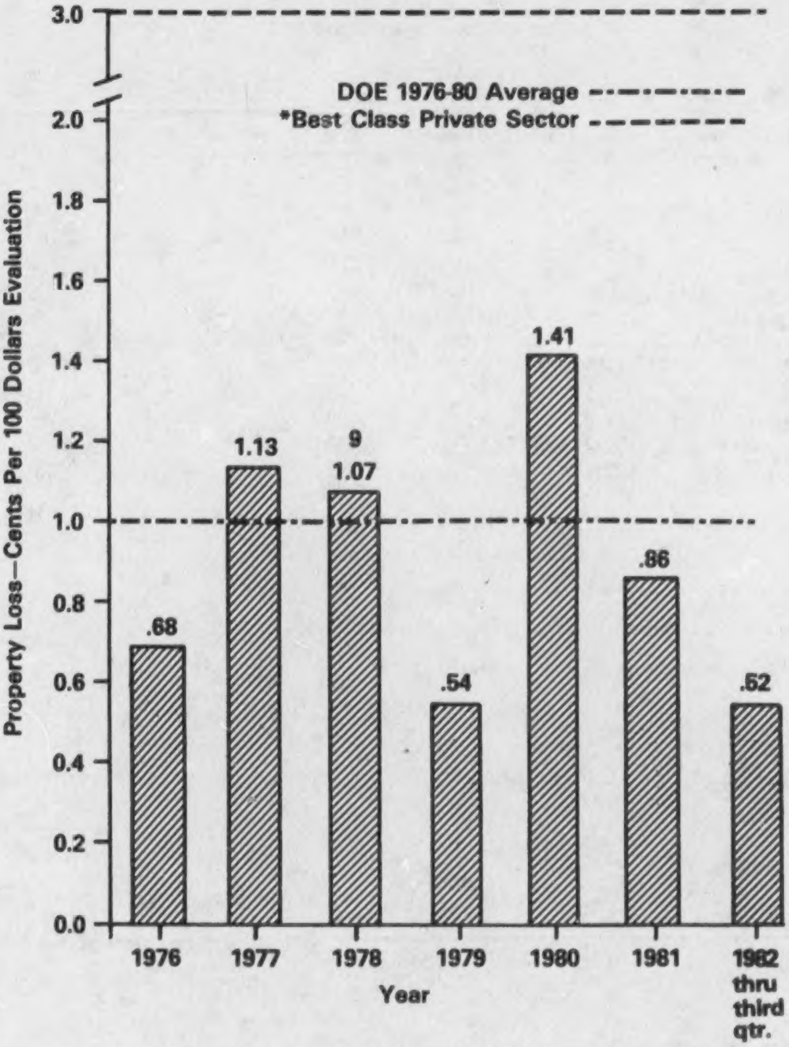


Figure 2. DOE and Contractor Recordable Injury Incidence Rates



* From discussions with engineering personnel from the fire insurance groups.

Figure 3. DOE and Contractor Total Property Loss Rates

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Environment, Safety and Health

Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Request	FY 1984 Base	FY 1984 Request
Environment, Safety and Health				
Operating Expenses				
1. Nuclear Safety................	$ 8,667	$10,375	$10,375	$13,500
2. Quality Assurance & Standards.	1,300	1,725	1,725	900
3. Operational Safety............	23,709	16,545	16,545	14,800
4. Environmental Compliance......	2,993	1,500	1,500	1,600
5. Environmental Analysis........	8,063	2,000	2,000	2,600
Subtotal..................	44,732	32,145	32,145	33,400
6. Program Direction.............	6,615	5,350	5,350	5,375
7. Capital Equipment.............	4,000	1,500	1,500	1,600
Total				
Operating Expenses..............	51,347	37,495	37,495	38,775
Capital Equipment...............	4,000	1,500	1,500	1,600
Environment, Safety and Health	$55,347	$38,995	$38,995	$40,375
Staffing FTE/Total FTE's..........	141/143	102/111	102/111	90/95

Authorization: Sec. 103, P.L. 93-438; sec. 203, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
(dollars in thousands)
Environment, Safety and Health

FY 1983 Budget Request	$38,995
Built in increases and decreases	0
FY 1984 base	$38,995
Program increases and decreases:	
Nuclear Safety	
--increased emphasis on developing policies for safety of nuclear operations and the independent appraisal to assure implementation, plus the strengthening of emergency response and radiation protection capability	+ 3,125
Quality Assurance and Standards	
--reduced need for contractor support; completed development of Unusual Occurrence Reporting System	- 825
Operational Safety	
--transfer of the radiological surveys and certification of uranium mills tailings, former MED/AEC and DOE surplus sites	- 3,000
--increased emphasis on environmental protection, safety and health protection at DOE operations	+ 1,255
Environmental Compliance	
--increased emphasis on the degree of technical detail in the defense, nuclear, and energy research programs' NEPA documents	+ 100
Environmental Analysis	
--increased emphasis on analysis of the impacts of proposed environmental regulations on DOE programs	+ 600
Program Direction	
--reduced full-time equivalent staff which support ES&H activities from 111 to 95, offset by higher salary & benefits costs	+ 25
Capital Equipment	
--expansion of equipment to support ES&H program activities	+ 100
FY 1984 budget request	$40,375

MAP OF DOE FIELD FACILITIES AND OPERATIONS

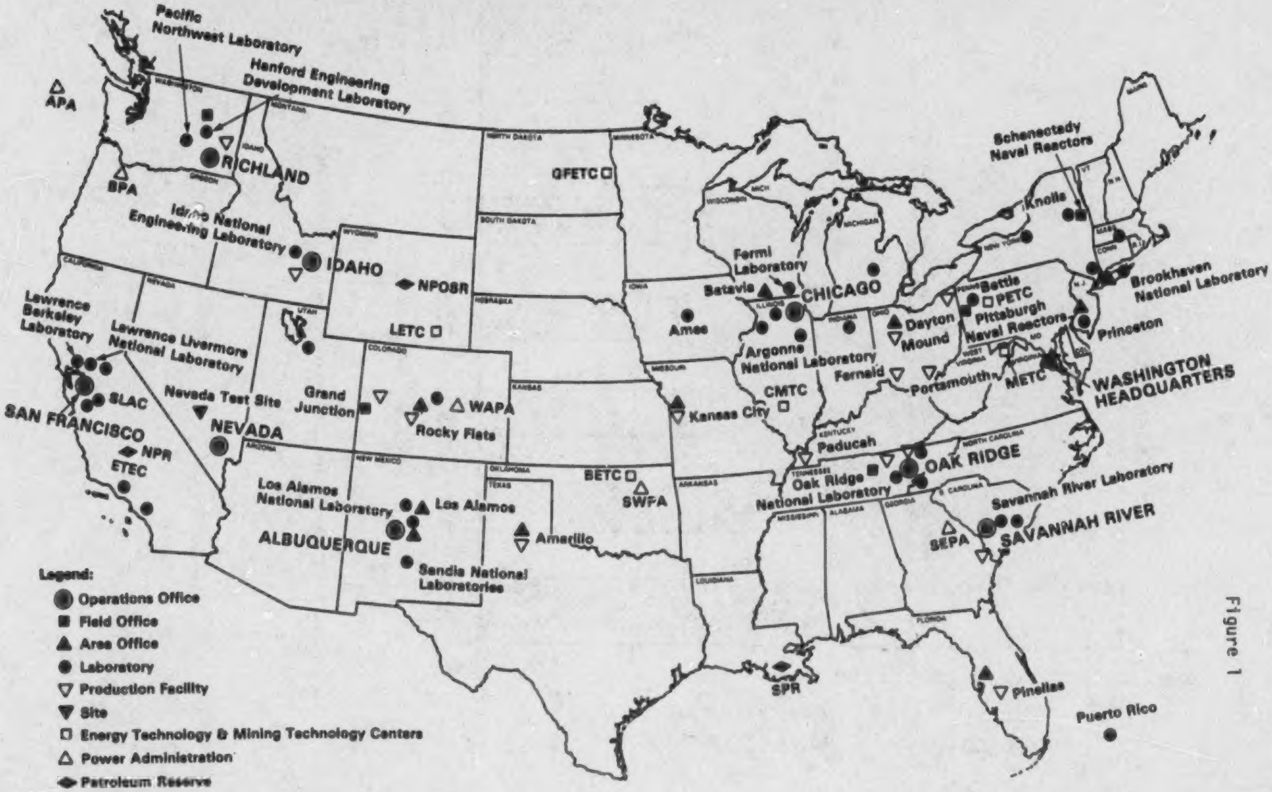

Pacific Northwest Laboratory
Hanford Engineering Development Laboratory
APA
BPA
RICHLAND
Idaho National Engineering Laboratory
IDAHO
NPOSR
LETC
GFETC
Lawrence Berkeley Laboratory
Lawrence Livermore National Laboratory
SLAC
SAN FRANCISCO
Nevada Test Site
NEVADA
NPR
ETEC
Grand Junction
Rocky Flats
WAPA
Los Alamos National Laboratory
Los Alamos
ALBUQUERQUE
Sandia National Laboratories
Amarillo
BETC
SWPA
Kansas City
Ames
Fermi Laboratory
Batavia
CHICAGO
Argonne National Laboratory
CMTC
Fernald
Dayton
Mound
Bettis
PETC
Pittsburgh Naval Reactors
Portsmouth
METC
Paducah
Oak Ridge National Laboratory
OAK RIDGE
Savannah River Laboratory
SAVANNAH RIVER
SEPA
SPR
Pinellas
Puerto Rico
Schenectady Naval Reactors
Knolls
Brookhaven National Laboratory
Princeton
WASHINGTON HEADQUARTERS
Legend:
● Operations Office
■ Field Office
▲ Area Office
● Laboratory
▽ Production Facility
▼ Site
□ Energy Technology & Mining Technology Centers
△ Power Administration
◆ Petroleum Reserve

Figure 1

1. Nuclear Safety - FY 1984 Request $13,500

The nuclear safety program assures an independent, agressive safety overview of the Department's complex, which includes 84 nuclear reactors and criticality facilities and over 200 other diverse and highly technical nuclear process facilities, with a replacement value of tens of billions of dollars. A map of the principal DOE field facilities is shown as Figure 1 at the end of the Program Overview section.

As a consequence of the Under Secretary's May 1981 Action Plan, the independent nuclear safety program has been upgraded through provision of outlay resources and staff. The funds requested will support the continued strengthening of the independent nuclear safety overview program and the Department's overall nuclear safety effort.

The Nuclear Safety program is implemented through two major activities: Nuclear Facility Safety and Radiological Controls.

	FY 1983 Request	FY 1984 Base	FY 1984 Request
1a. Nuclear Facility Safety	$ 3,000	$ 3,000	$ 4,550
1b. Radiological Controls	$ 7,375	$ 7,375	8,950
Total Nuclear Safety	$10,375	$10,375	$13,500

1a. Nuclear Facility Safety - FY 1984 Request $4,550

Introduction and Background

The Department's Nuclear Facility Safety activity is a focused effort to:

- Develop policy, standards, and requirements to be followed by all Departmental line organizations and the Operations Offices to assure adequate safety of nuclear operations.
- Conduct independent appraisals to assure consistent implementation of nuclear safety policy and to overview the quality and effectiveness of the Department's nuclear safety programs.
- Develop and promulgate generic minimum qualification and training guidance for personnel responsible for management and operation of Department-owned nuclear facilities.
- Conduct generic safety studies of Departmental facilities and operations which provide a base for the development of policy, standards, and guidance to strengthen Departmental nuclear safety programs.
- Provide nuclear technical expertise and assistance in specialized environmental, safety and health areas for Headquarters' line organizations and Operations Offices safety staffs.
- Conduct reviews and analyses of safety analysis reports and of unusual occurrence reports, perform trend analyses of facility operational performance, and review of

Nuclear Regulatory Commission (NRC) guidance for licensed facilities to determine applicability to Departmental nuclear facilities.

FY 1984 Request

Policy, Standards and Guidance efforts will include the development and interpretation of standards and requirements, which involve active participation with standards setting bodies, other Federal agencies, Headquarters' organizations, Operations Offices, and contractors. Such participation ensures that Departmental interests are considered in the establishment of consensus standards and external requirements and that subsequent Departmental requirements are reasonable and consistent with the National and consensus standards.

The program for evaluation of regulatory documents, guides, and requirements to ensure that all the Department's facilities take into account the actions being taken to regulate licensed commercial facilities will be expanded to include facilities other than reactors. This is a complex task due to the very diverse and unique nature of the Department's nuclear facilities. The program in FY 1984 will continue to conduct in-depth analyses of the most significant new regulations as they may apply to the Department's nuclear program.

Comprehensive Appraisals of five Departmental Field Operations (Richland, Nevada, Oak Ridge, Savannah River and Strategic Petroleum Reserve) and one Headquarters' line organization (Energy Research) to assure consistent implementation of nuclear safety policy and to overview the quality and effectiveness of the Department's nuclear safety programs will be conducted. A cadre of independent experts, initially developed in FY 1982, will be expanded as needed to provide the technical expertise necessary to complement the available Headquarters' staff in the conduct of this activity.

Training Initiatives regarding training programs in response to the Under Secretary's Action Plan (DOE/S-0007) and the subsequently revised Departmental safety orders will be continued and expanded beyond reactor operator training to include operators of other nuclear facilities. Training program activities will be directed at requirements to (a) develop generic personnel selection, qualification and training requirements for nuclear facility operations personnel; (b) define the scope and content of such training programs; and (c) develop methods for the independent validation of the training programs.

Generic Safety Technology review of Departmental nuclear facilities and operations will provide insight into identification of generic problems and methods for their correction, as well as into the need for standards, requiremtns or guidance, to ensure transfer of applicable knowledge throughout the Department's nuclear complex. Similarly, development of generic safety technology will continue to focus on (a) methodology for evaluating the hazards to Departmental nuclear facilities from natural phenomena, (b) design and safety analysis tools for evaluating tornado and internal explosion transient response in nuclear facility ventilation sytems, (c) develoment of guidance for utilization of human factors in facility design and operation, and (d) methodology and application of techniques for assessing and implementing nuclear criticality safety in Department operations and facilities.

Analysis of Operations and the systematic analysis and review of facility operating experiences, whether in the licensed commercial sector or in Departmental facilities, will provide for the transfer of knowledge to improve specific facility operations from the safety perspective and enhance nuclear safety throughout the Department's nuclear complex. Activities will be stressed to assess operating experience, in particular abnormal occurrences, in terms of generic safety significance to operating Departmental nuclear facilities. Efforts will be expanded to emphasize Operations Offices and contractor activities related to facility operational readiness preparation and reviews. These efforts will include expanded overview and technical support and assistance from independent specialists.

1b. Radiological Controls -FY 1984 Request $8,950

Introduction and Background

The Radiological Controls activity provides a balanced effort to:

- Provide strong management and policy direction to Department-wide radiation protection programs with provision for technical assistance through direct staff support.
- Maintain a state-of-the-art national radiological emergency response capability to detect and assess all types of radioactivity in the environment and assess the consequences.
- Assist other Federal, State, and local authorities in the technical aspects of their radiological emergency planning, preparedness, and response activities.
- Conduct independent overview and appraisals to achieve consistent and validated radiation protection and emergency preparedness at all Department-controlled facilities.

Radiation protection codes, guides, standards and procedures are developed for use by DOE field operations. Through the appraisal program, the effectiveness of their field-level implementation is assessed and, as appropriate, included in modifications or formulations of DOE radiation protection policies. At the same time, close interaction is maintained with national and international radiation standards development bodies both to provide these groups with the wide spectrum of DOE experience in occupational radiation protection and to monitor technological and operational developments of others.

Emergency response activities are highlighted by unique resources to monitor and assess any accidental release of radioactivity from a nuclear facility. Aircraft are maintained to be ready to employ state-of-the-art remote sensing equipment to map rapidly large areas which may have been affected by an accidental release. A computer-based system, the Atmospheric Release Advisory Capability (ARAC) uses actual weather and terrain to predict on a regional scale the transport, diffusion, and deposition of any radioactivity released to the environment. Complementing these systems is an experienced cadre of scientists, engineers and technicians who are always available to assist local authorities and to coordinate DOE and other Federal responses to an accident. Additionally, Departmental non-weapons radiological emergency preparedness policies are coordinated through this activity.

FY 1984 Request

The FY 1984 request for the Radiological Controls activity is $8,950,000. Radiation protection of DOE contractor workers will be enhanced through improvements in in-plant radiological measurement systems, techniques, methods, and standards. Specifically, occupational air sampling methodology will be evaluated and appropriate guidance developed for DOE operations. Guidelines for maintaining radiological exposures as low as reasonably achievable will be revised and promulgated to the DOE Operations Offices. Neutron and beta particle measurement will be improved, along with the accompanying procedures for implementation. Improved methods and analyses for internal dose assessment to comply with the intent of proposed standards will be developed. Improved methodology for determining surface contamination levels is also planned.

The Department's emergency response capability will continue to provide the Atmospheric Release Advisory Capability (ARAC) predictions. The ARAC response will provide DOE officials with real-time predictions of the consequences of a release to the atmosphere. It would graphically show radiological effects on the people and environment in the path of the release as it is carried by actual winds and atmospheric currents. Such information at the earliest stages of an accident is essential for determining effective and accurate protective actions designed to protect the health and safety of the public. An expansion underway for the DOD, will be integrated with the development of a single system for responding to the needs of State and local governments in a variety of types of nuclear accidents. Radiometric baseline surveys will be conducted by aircraft at an estimated 30 nuclear sites. Radiometric survey data of major nuclear installations in the U.S. will continue to be gathered and revised in order to provide a baseline for determining the consequences of any radiological accident. Such surveys are also essential for employing on a day-to-day basis those technical personnel, aircraft, and monitoring equipment which would be rushed to the scene of a radiological emergency at Departmental installations, or any other nuclear facility nationwide. Participation with the Federal Emergency Management Agency and other agencies in exercises of the Federal response plans is scheduled. With DOE emergency planning criteria expected to be in place, appraisal procedures will be revised.

2. QUALITY ASSURANCE AND STANDARDS - FY 1984 REQUEST $900

Introduction and Background

Departmental quality assurance policy has gradually evolved over the years under the impetus of various internal and external reviews, most recently a post-Three Mile Island (TMI) review whose mission was to assess the implications of the TMI accident to the Department's nuclear reactor programs. This review recommended establishment of formal quality assurance policy and an office for its coordination and oversight.

During FY 1982, a new organizational component, the Office of Quality Assurance and Standards (OQAS), was established within the Office of Environment, Safety and Health (ES&H). The OQAS is assigned the Departmental lead for overall quality assurance policy formulation, including generic standards and guidelines. It also has the lead for performing appraisals to review and evaluate implementation of quality assurance policy directives. Since the quality assurance coordination and oversight function crosses organizational lines, and is in part safety related, the OQAS was placed in ES&H. This placement also ensures organizational independence from direct responsibility for program operations.

Basic Departmental quality assurance policy, promulgated through Departmental Order 5700.6A in August 1981, declares that plans and actions to assure quality achievement in DOE programs shall be established, implemented, and maintained with primary emphasis on achieving a high degree of operational success and with due consideration to health, safety, environmental protection, performance reliability, and other concerns.

The objective of quality assurance policy as practiced in DOE is to assure that research and production activities are performed in a controlled manner, that components, systems, and processes are designed, developed and operated according to appropriate quality assurance requirements. Such requirements are typically defined by national standards. For example, the preferred standard within DOE for nuclear activities is ANSI/ASME NQA-1 which prescribes 18 basic requirements within the quality assurance program. The requirements are selectively applied to each operation, and typically establish management controls for such activities as design, purchasing of materials, construction, testing, etc. The purpose of the OQAS activity is to assure that such requirements are established and executed properly in DOE programs. Assurance is provided principally through internal policy coordination and the regular performance of independent overview and management appraisals. The overview function, while similar conceptually to that performed by the Offices of Nuclear Safety and Operational Safety encompasses a set of concerns much broader than environment, health, and safety.

FY 1984 Request

Quality assurance overview activity will continue to be the principal activity of the OQAS program in FY 1984. A report to top management will be submitted summarizing the results of the baseline quality assurance surveys conducted through FY 1983. Overview activities will be intensified with initiation of formal quality assurance appraisals of the DOE Headquarters programs and Field Management Offices including the Power Administrations, Strategic Petroleum Reserve Operations (SPRO), and the Naval Petroleum Reserves (NPR). The desired goal for the overview activity is to provide appraisal coverage of the significant programs of the Department on a two-year cycle. The objective of the management appraisals is to evaluate managerial effectiveness in establishing and implementing quality assurance programs in conformance with DOE policy requirements. In addition, reviews of selected major projects or major systems acquisitions will be initiated to evaluate the extent to which quality assurance guidelines developed in FY 1983 are being applied.

Funding for quality assurance is decreased from FY 1983 levels to reflect greater reliance on internal staff expertise to perform the appraisal function and related overview activities of the office. The appraisal cycle will extend beyond the desired two-year cycle.

OQAS staff will continue to be subject to external demands related to comprehensive ES&H appraisals, service on Field Office contractor audit teams and assistance to program offices on quality assurance and standards matters.

The standards program will emphasize continued liaison with volunteer standards bodies, continued development of the standards information base, and overview of standards activities in the programs through the appraisal mechanism. OQAS support of the computer-aided Environmental Legislative Data System (CELDS) will be discontinued.

Maintenance and operation of the Unusual Occurrence Reporting System will be at the sustaining level as developmental activity will have been completed in FY 1983. All incoming reports will be reviewed for generic significance and those qualified as having generic significance will be properly disseminated to interested parties through Information Notices.

Metrication activity will continue to maintain liaison with metrication committees and monitoring of metrication policy developments.

3. Operational Safety - FY 1984 Request $14,800

The goal of the Operational Safety Program is to assure that the Department of Energy is in conformance with environmental protection, safety, and health protection (ES&H)

policies, laws and principles, and that the Department maintains high quality ES&H performance levels in its operations. The Program operates under the requirements of the basic DOE Order 5480.1A, Environmental Protection, Safety and Health Protection for DOE Operations; The Atomic Energy Acts of 1946 and 1954; and The Occupational Safety and Health Act of 1970. In addition, three additional statutes govern the program's activities.

- o PL 95-604, Uranium Mill Tailings Radiation Control Act of 1978, requires determining the existence of mill tailings, and the level of radioactive contamination; taking remedial action to reduce contamination to safe levels; and certifying adequacy of remedial actions.

- o PL 96-205, Omnibus Insular Areas Act of 1979-1980, requires the Secretary of Energy to assume costs of a comprehensive health care program and radiological monitoring, dose assessment, information and education for people exposed to radiation from the Pacific nuclear weapons testing program.

- o PL 95-134, Authorization, Appropriation-U.S. Territories, requires the Secretary of Energy to provide for the medical care and treatment for radiation related illness and injury among Rongelap and Utirik populations exposed to fallout from the Bravo nuclear test in 1954.

The responsibilities and authorities for safety, health and environmental protection of each organizational tier are shown below:

SAFETY, HEALTH AND ENVIRONMENTAL PROTECTION RESPONSIBILITIES AND AUTHORITIES

"Program Secretarial officers are assigned basic responsibility for implementing the DOE Environmental Protection, Safety, and Health Protection Program. This responsibility includes...assurance that (ES&H) policies, directives and orders are adhered to continuously and vigorously in all DOE operations

"Heads of Field organizations...shall, for facilities and operations under their jurisdiction...execute programs and assure that contractors and their subcontractors execute programs and policies in a manner that shall include compliance with prescribed requirements relating to (ES&H)

"The Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness is responsible for providing an independent overview of the Environmental Protection, Safety, and Health Protection Program...(and) develops policies, standards, guides, requirements, and procedures covering (these programs)." Doe Order 5480.1A (8-13-81)

The Operational Safety program develops policies, standards and guidance for ES&H in DOE operations (except for specific nuclear operational safety activities covered by the Nuclear Safety program). An oversight activity is conducted to determine how the policies and standards are implemented throughout the Department. The overall performance of DOE in regard to ES&H is assessed through collection and analysis of monitoring and incident data for DOE Field and Headquarters operations. This program also assures that these responsibilities receive Department-level oversight in areas for which the Department is specifically held accountable by Federal legislation. These areas include Government-owned contractor-operated facilities not subject to the Occupational Safety and Health Act; hazardous waste responsibilities exempt from Environmental Protection Agency standards; aviation operations exempt from Federal Aviation Administration regulations; and nuclear materials packaging safety exempt from Nuclear Regulatory Commission requirements. Operational Safety program activities also include: (a) the responsibility for providing oversight and for determining the adequacy of remedial actions undertaken by the Department to clean up sites and facilities contaminated by past nuclear operations, and (b) the Departmental obligations for health care services and environmental studies related to past U.S. nuclear weapons testing in the Marshall Islands and Nevada.

Program effectiveness depends primarily on the availability of skilled technical staff at Headquarters working together with DOE field and program offices to perform the essential ES&H functions. The funds provide technical assistance for improving ES&H policies and guidance, conducting effective appraisals of their implementation, and collecting data and evaluating the Department's performance in the area of environmental protection, safety, and health protection.

The Program consists of four subprograms: Environmental Protection, Safety, and Health Protection; ES&H Performance Measurements; Radiological Surveys and Certification; and Marshall Islands and Related Sites.

		FY 1983 Request	FY 1984 Base	FY 1984 Request
3a.	Environmental Protection, Safety and Health Protection	$3,445	$3,445	$4,700
3b.	ES&H Performance Measurements	1,200	1,200	1,600
3c.	Radiological Survey and Certification	5,500	5,500	2,500
3d.	Marshall Islands and Related Sites ..	6,400	6,400	6,000
	Total Operational Safety	$16,545	$16,545	$14,800

3a. Environmental Protection, Safety, and Health Protection - FY 1984 Request $4,700

Introduction and Background

The goal of this subprogram is (a) to advance the goals of restoring, protecting, and enhancing environmental quality in the operation of energy and defense programs and activities throughout the Department, and (b) to assure the safety and health of the public, protection of government properties against accidental loss and damage, and safe and healthful work places and conditions of employment for some 130,000 DOE contractor employees at 159 industrial and research sites across the United States. Activities include air and water protection, hazardous waste management, aviation safety, packaging safety, fire protection, explosives safety, industrial safety, occupational medicine, and industrial hygiene. In these areas, ES&H policies, standards and requirements are developed for the Department, independent appraisals of the program and field operations are conducted, and technical guidance and interpretation of policies and DOE orders are provided. Appraisal results are provided to DOE senior management as an integral part of the ES&H assurance system.

FY 1984 Request

The FY 1984 budget request for Environmental Protection, Safety, and Health Protection is $4,700,000, an increase of $1,255,000 over the FY 1983 level of $3,445,000. The increase is principally in the hazardous waste, aviation safety, and air/water protection activities discussed below. Policy revision, guidance development, and appraisals will continue as the principal functions of this activity.

Environmental protection activities will be directed at making significant improvements in the environmental monitoring, data collection, and reporting system for DOE field operations. Technical guidance on monitoring and dose assessment modeling will be revised. A quality assurance interlaboratory program will be established to make the environmental data collected and reported more useful for evaluating the adequacy of the environmental protection being provided across the entire field operations of the Department. Guidance and criteria will also be developed or revised for the following areas: transuranics in soil, ground water, pesticides, ecological issues, and thermal pollution. These activities will support the development of a more unified and reliable environmental protection system for DOE.

Inventories of hazardous wastes needing attention at DOE facilities and policies and methods for managing these wastes will be completed. Efforts will continue to assure that the DOE environmental protection program meets the basic needs of the Department. Activities will include update of DOE orders, establishment of emergency dose modeling criteria, completion of a fully integrated environmental data and compliance system for facilities and operations, implementation of an Environmental Impact Statement/Safety Analysis Review (EIS/SARS) followup system, and development of a matrix-based appraisal system and plan.

Guidance and training for field office safety staff will be increased in an effort to reduce aviation accident losses of life and property. Emphasis will be placed on aircraft crew qualifications and life support systems.

Changes are currently taking place in Federal regulations for packaging nuclear materials for shipment. Although DOE is not formally required to meet these regulations, its packaging safety program aims at exceeding these requirements. Guidance for field operations on improvements in nuclear packaging requirements will be developed. An examination of how to handle criticality issues in shipments of multiple packages will be completed.

Fire protection surveys at five additional sites will be conducted with emphasis on operations related to nuclear weapons and nuclear reactors (Naval Petroleum Reserve in California, Gaseous Deffusion Plant in Tennessee, Energy Technology Engineering Center in California, several sites at Bonneville Power Administration in Washington, and Lawrence Berkeley Laboratory in California). Surveys are made at such facilities at 3 to 5 year intervals. By the end of FY 1984 validated practical models will have been developed to provide more understanding of the relationship of fire growth, fire protection system reliability, and countermeasure effectiveness unique to DOE facilities. A procedure will be developed and guidance issued to help field personnel to assess fire risks and apply appropriate countermeasures. Through these efforts DOE operations will be able to match fire protection systems with projected hazards. DOE has maintained a continuing superiority in its low fire loss record since this activity was begun in 1969. A chart showing total property loss rates for DOE in comparison to Industry is shown as Figure 3 at the end of the Program Overview section.

The Toxic Materials Advisory Program will expand its capability to provide exposure level guidelines. The goal of this program is to assure that guidance exists for all potentially hazardous chemical and physical agents in DOE workplaces. The program will be coordinated with the American National Standards Institute to assure that there is no duplication of effort and that the products are technically sound. Efforts will continue in providing the entire DOE community with access to an on-line toxicity information data base.

An Industrial Hygiene Task Force will be maintained to assure that technical support is available to solve special short term problems when no other source is available. This support is expected to continue to be used by programs developing new energy technologies (e.g., fusion), field programs (e.g., power administrations), and Federal employee programs. The Task Force will increase its efforts to support existing DOE contractor-operated programs by performing special studies on new environmental sampling and analyses methods and control technologies. Technical guides will be prepared on DOE's extensive industrial hygiene problems that are unique to its operations.

Respirator studies will continue to meet the critical need for testing the unique respiratory protective devices developed for use in DOE nuclear facilities (e.g., supplied-air suits); and support to DOE facilities on aspects of respirator use will be provided. In addition, written technical guidance will be prepared as appropriate to help improve the overall quality of DOE respiratory protection programs.

3b. ES&H Performance Measurements - FY 1984 Request $1,600

Introduction and Background

The objective of this subprogram is to collect, analyze, and disseminate information related to the performance of environmental protection, safety, and health protection activities conducted at field organizations and within the DOE Program Offices, for use by both field organization and Headquarters management.

Policies, procedures, standards, and guidelines are developed for notification, investigation, and reporting of environmental, safety and health occurences in the DOE and DOE contractor operations. Field organization safety and health protection information is compiled and reported, and advanced system safety techniques and methodologies are developed for use throughout the Department's operations. A chart showing DOE and Contractor Recordable Injury Incidence Rates in comparison with Industry is shown as Figure 2 at the end of the Program Overview section.

FY 1984 Request

The FY 1984 budget request for this activity is $1,600,000, a $400,000 increase over the FY 1983 level of $1,200,000. This level of funding will permit completion of the DOE Safety Performance Measurement System so that the Department's information management systems on radiation exposures, injury/illness, property damage, and environmental data can be integrated in a logical and more efficient data gathering, analysis, and dissemination system. Such a system would provide the Department, for the first time, with the capability to establish comprehensive analyses of the environmental protection, safety, and health protection performance at its operating facilities. The results of these analyses can help assure that resources will be properly allocated and new efforts undertaken, where indicated, to reduce residual risks to acceptable levels, consistent with Departmental and national policies.

The development of new ES&H guidelines will return to the rate of five per year. Workshops and seminars for ES&H training purposes will be conducted on the following schedule: four MORT seminars per year; three Accident Investigation workshops and refresher courses per year; three Appraisal workshops per year; three Risk Assessment seminars per year; three Operational Readiness seminars per year; and three Human Factors workshops per year.

3c. Radiological Survey and Certification - FY 1984 Request $2,500

Introduction and Background

The Department had previously assigned EP the responsibility to independently determine the nature and extent of contamination and the need and priority for remedial activities at sites and private properties in their vicinities, where nuclear operations were formerly conducted for DOE or its predecessor agencies. Properties are designated by Nuclear Energy (NE) or Defense Programs (DP) for remedial action by commercial contractors, with priorities determined by potential health risks developed on the basis of comprehensive radiological survey reports. A key activity is to certify that final conditions comply with applicable radiological standards and criteria and to prepare dockets of all activities and data for DOE archives. The program activity is implemented by aerial, mobile, and comprehensive radiological surveys, and radon monitoring projects conducted by groups from DOE laboratories and facilities.

FY 1984 Request

Under this budget request EP would provide health standards and methods for conducting site specific health assessments, develop a Departmental policy for the certification of completion of remedial action, and overview the operations of the Remedial Action Program. The other organizations, principally NE, would determine the need and priority for cleanup, conduct remedial action, and certify as to the completion of cleanup at each site.

3d. Marshall Island and Related Sites - FY 1984 Request $6,000

Introduction and Background

Through this activity the DOE continues to carry out its health and environmental obligations and responsibilities with respect to residual studies resulting from the U.S. nuclear weapons testing program and related activities, primarily in the Marshall Islands and at and near the Nevada Test Site (NTS).

DOE interests in the Pacific, supplemented by public laws (PL 95-134 and PL 96-205) and interagency agreements with the Departments of Defense (DOD) and Interior (DOI) include:

- Provision of medical care to those persons with radiation related illness and diseases and who were directly exposed to radiation from the nuclear weapons testing program.
- Radiological monitoring of the populations living on atolls which remain contaminated with radioactivity.
- Radiological monitoring of the environment.
- Radiation dose assessments for the population living on or returning to atolls contaminated with radioactivity.
- Logistical support for all of the above activities.

The Department is continuing two additional programs related to health and environmental concerns associated with the weapons testing program: (a) all available dosimetry source documents and information relating to nuclear device development and testing at the Nevada Test Site and in the Pacific are being assembled into a master file for use in radiation epidemiology studies and for use in litigation proceedings involving the

Department; and (b) a reassessment of radiation exposure levels to the off-site population in areas surrounding the Nevada Test Site from past testing programs is being carried out. This latter study will characterize the exposure by region, community or locale, age and occupation, and include studies of fallout distribution, pathways of the fallout radionuclides through the environment to man, external and internal dose reassessment (including exposure via inhalation and ingestion), and data analysis.

Information from these programs and assessments are used to provide radiological advice to DOD and DOI and other agencies of the U.S. Government, to inform Congressional committees and their staff, to inform officials of the Marshall Islands Government, and to respond to inquiries from Nevada Test Site off-site residents and Marshall Island residents and their technical and legal advisors.

FY 1984 Request

The FY 1984 budget request is $6,000,000, a decrease of $400,000 from the FY 1983 level of $6,400,000. The current level of effort of this subprogram in the Marshall Islands will be continued to meet statutory and interagency obligations; to be responsive to Congressional inquiries; to respond to inquiries from and conduct negotiations with the Government of the Marshall Islands; and to answer inquiries from other interested parties (e.g., States and public).

Medical care and/or radiological monitoring of the Rongelap, Utirik, Bikini and Enewetak people will continue. Radiological monitoring of the environment will be continued to confirm or modify previously predicted radiation doses, and to maintain an awareness of contamination levels, the transport of radionuclides, and the removal rate of radionuclides through nature or enhanced processes. Comparisons of predicted radiation doses with radiological monitoring of populations will begin. Processing of dosimetry records will continue. These records will be used to respond to requests from numerous sources for dosimetry information. Data will be released under the same regulations that apply to the dissemination of medical information.

Population and individual dose assessment studies in Nevada will continue. The reconstruction and reassessment of internal and external radiation exposures to individuals and communities off the Nevada Test Site resulting from radioactive fallout associated with the atmospheric nuclear weapons test, particularly those conducted in the 1950's, will be extended to more distant locations (e.g., portions of Idaho, Wyoming and Colorado). Because no dosimetric information is available for these more distant areas, fallout model predictions using newly developed source term data for each test, plus applicable wind data, will be used to estimate retrospectively radiation exposures. Analytical techniques will permit differentiation between direct fallout from the Nevada Test Site and global fallout. Current environmental sampling and monitoring in these more distant locations will be used to verify the radiation exposure estimates.

4. ENVIRONMENTAL COMPLIANCE - FY 1984 REQUEST $1,600

Introduction and Background

The goal of this program is to ensure that the Department's actions are not delayed by external intervention due to non-compliance with the National Environmental Policy Act (NEPA), P.L. 91-190, or other environmental requirements.

The Environmental Compliance element, which was established as a distinct Office in FY 1982 to strengthen its effectiveness, implements an independent review program to assure Department compliance with NEPA and other environmental requirements bearing on project development activities. NEPA and implementing regulations require that Federal agencies prepare and consider in decisionmaking NEPA review documents, i.e., environmental impact statements (EIS's) and environmental assessment (EA's). In FY 1981 DOE streamlined its NEPA procedures so that many actions are reviewed and retired with only a brief memorandum to the record; only cases which require substantive analysis to reach an EIS decision warrant preparation of an EA. Because compliance with NEPA is a prerequisite to the implementation of the Department's programs and projects, timely and adequate NEPA review documents are critical to the successful implementation of Department actions. Late preparation causes needless and costly delays, and inadequate NEPA documents can result in litigation, prolonged delays, added costs and other non-compliance problems.

To protect the Department's actions from such problems, the Environmental Compliance element performs a variety of staff intensive functions including:

- Analyzing proposed programs and projects and determining the required level of NEPA review, i.e., EA or EIS, early in the planning stage of a Department action to enable timely preparation of documents;
- Assisting and guiding Department offices in scoping the content of and preparing required EA's and EIS's to facilitate compliance and to avoid delays;
- Reviewing and assisting in the preparation of associated NEPA materials such as public notices, EIS implementation plans, and Records of Decision, and participating in public hearings and meetings on Departmental EIS's to assure that NEPA procedural requirements are met;
- Resolving interagency disputes over the scope, content, or adequacy of Departmental EA's and EIS's;
- Independently reviewing all Department EA's and EIS's to assure that NEPA requirements and standards of document adequacy are met; and
- Providing support and expert assistance to the Department's defense against NEPA litigation.

NEPA requirements and standards are embodied in the statute, implementing regulations, case law, and Department precedents. The application of these requirements to Department projects is a Federal responsibility. Therefore, the functions performed by the compliance element are in the nature of staff services to the Department and the imposed workload on the compliance program is based on the Department's program and project activities. As a result of the compliance element's efforts, there have been very few Department projects delayed because of NEPA-related intervention or other environmental compliance problems.

The Environmental Compliance element is also responsible for developing generic guidance, compliance planning systems, and training for Department personnel on NEPA and associated environmental compliance requirements related to new and proposed projects, and for providing expert advice to assist Department officials in securing other Federal and State environmental permits and approvals. In addition, the element is frequently called upon to provide specialized environmental support and assistance for major Department activities such as the Clinch River Breeder Reactor and other Major System Acquisition Projects as well as for special initiatives such as Nuclear Licensing Reform and the Nuclear Waste Terminal Storage (repository) Siting Plan.

FY 1984 Request

The FY 1984 budget request for the environmental compliance program is $1,600,000.

This request would provide the resources required for a viable NEPA compliance program to protect the Department's projects and programs from undue interruption and costly delays caused by inadequate NEPA or other compliance planning or by inadequate NEPA documents. The NEPA workload demands on the program are primarily associated with the Department's defense, nuclear energy, and energy research programs. In FY 1984 the workload imposed by these programs is expected to be similar to the FY 1983 workload and will include: (a) approximately 150-200 analyses of Department actions to determine/confirm the level of required NEPA documentation and to provide other early advice; (b) detailed guidance on and direct participation in the preparation of an estimated 70-80 NEPA documents; and (c) 140-160 independent quality control reviews of NEPA documents. In addition, the program will be called upon to provide support and expert assitance in the Department's defense against anticipated NEPA litigation. The program will perform a variety of staff intensive support and review functions in responding to the needs and demands imposed on it by the Department's programs and projects. These staff functions involve analyses, interpretations, and compliance determinations for a Federal statute (NEPA) and are therefore a government responsibility that can only be performed by Department personnel. In addition, because these functions are accomplished prior to project implementation they must be performed within strict limits of timeliness and quality to avoid project implementation delays.

The contract funding requested will provide for specialized technical support to the staff to ensure the scientific and analytic accuracy and objectivity of the Department's EIS's and EA's. Such technical support requires a breadth and depth of specialized skills in combinations which are otherwise not available to Department staff. The request is commensurate with the expected project activity level and the technical complexity and controversial nature of the environmental issues associated with these projects, and reflects the need to secure the services of specialized, experienced contractors to deal with these technical issues.

5. Environmental Analysis - FY 1984 Request $2,600

Introduction and Background

The Environmental Analysis program provides a Departmental focal point for analysis of current and emerging environmental issues, laws, regulation, and technologies that impact U.S. energy supply and Departmental policies, plans, programs, and facilities. It analyzes and coordinates Department responses to regulatory proposals that may impact energy activities. To support this function, it represents the Department's interests in the Federal regulatory development process, maintains comprehensive environmental data bases, conducts anticipatory analyses for early identification and scoping of emerging regulatory issues, and provides environmental technical support and guidance to

Department programs. Adequate early warning of potential new environmental, safety and health regulations can often avoid months of project delays due to such problems as permit denials or injunctions.

The Environmental Analysis element provides analytic support to the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness (ASEP) in his role as the Secretary's principal advisor on environmental matters. During FY 1984, the Department will be experiencing a greater need for environmental analysis services as a result of the growing frequency of energy-related environmental issues that are raised by the Administration's ongoing reevaluation of environmental laws, regulations, and policies. The element provides mission-related data and assessment support to other Department and ES&H organizations, NEPA compliance, and major systems acquisition activities through direct assistance, assessment reports and policy guidance. It assures that all Department initiatives consider environmental perspectives, and, conversely, assures that Federal environmental decisions reflect National energy goals.

FY 1984 Request

The FY 1984 budget request for the environmental analysis activity is $2,600,000. The extensive investigations, technology and environmental assessments, analytical methods development, and data information base acquisition and maintenance of predecessor programs over the past four years, allows the Environmental Analysis program to respond to regulatory review requirements in the more stream-lined, principally Headquarters staff analysis mode, begun in FY 1983. Activities will be concentrated on those areas which support current regulatory analysis such as acid rain. Information management programs will focus on data base maintenance for high-priority air, water quality and solid waste parameters related to current regulatory actions.

FY 1984 analyses of the impacts of proposed environmental regulations and laws on energy policies and the energy industry will receive first priority. Technical analysis services to Department program offices to assist in developing cost-effective compliance strategies for Department facilities will be provided as needed. Many new environmental regulations (e.g., pursuant to Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, Radiation Standards, NRC licensing, etc.) are being proposed for promulgation during FY 1984, which could have significant impact on the Department's research and defense operations and impact energy facilities. Since the staff has participated actively in the regulatory development process for several years, they have extensive knowledge of the scope and intent of new regulations, and will continue to provide advice to field offices and contractors on reduced cost compliance strategies.

Some regulatory changes involve transfer of authority to the States, resulting in different requirements for facilities located in different regions. These activities will be monitored so that summary reports of developments can be provided to program offices for further consideration. This activity is crucial, since recent court decisions have held that States can force closure of noncomplying Federal facilities. Such shutdown delays could affect national defense or lead to millions of dollars of increased capital expenditures.

Environmental control technology operating experience in the energy industry will be surveyed to improve operating cost and reliability information which will be used in evaluation of new control technology regulatory proposals. Research results from private sector efforts will be reviewed to assess improvements in the state-of-the-art, so that projections of the impacts of new energy facilities will be more realistic.

6. Program Direction - FY 1984 Request $5,375

	FY 1983 Request	FY 1984 Base	FY 1984 Request
Funding	$5,350	$5,350	$5,375
Staffing (FTE/Total FTE)	102/111	102/111	90/95

FY 1984 Request

The FY 1984 budget request is $5,375,000, a $25,000 increase above the amount budgeted in FY 1983. This budget includes the salaries for 95 full-time equivalent personnel, lump sum payments upon retirement, overtime, equalization pay, incentive awards, and severance pay. Also included in this activity, are the normal agency contributions to benefits and the travel directly related to program accomplishments. This request also provides for the normal increased personnel costs above the FY 1983 level, such as within-grade increases, and allows for some increase in travel consistent with the redirection in FY 1982 and FY 1983 to place increased emphasis on nuclear safety appraisals and assistance to the field on nuclear safety, occupational safety and quality assurance programs.

The budget request for 95 staff years represents a decrease of 16 staff years below the FY 1983 planned level and would limit the staff resources to the minimum necessary to accomplish the federal staff responsibilities in assuring protection of the environment, safety of the workers and the public, and protection of the property of DOE. To conduct the Environment, Safety and Health Program, federal staff are required to provide effective services to the Department in assuring or continuing a high level of performance in ES&H activities. Adequate Federal Headquarters personnel, trained and experienced in ES&H affairs, is the most essential ingredient for this program. It is the policy of the Department that policy development and oversight functions be performed only by Federal employees.

7. Capital Equipment -FY 1984 Request $1,600

	FY 1983 Request	FY 1984 Base	FY 1984 Request
Capital Equipment	$1,500	$1,500	$1,600

Departmental Request

The FY 1984 capital equipment request of $1,600,000 for the Environment, Safety and Health (ES&H) program represents a $100,000 increase above the FY 1983 level. This equipment funding is in support of the ES&H programs' operating activities conducted at seven national laboratories and 16 dedicated Department-wide contractors. A wide variety of capital equipment is required to pursue the diverse program of research and assessment of environment, safety and health impacts of energy production. The variety and complexity of research conducted requires specialized and sophisticated equipment, and the necessity to maintain state-of-the-art capability makes it essential that funds be provided to support the research and assessment activities.

The requested $1,600,000 will provide equipment funds for the purchase of additional and replacement equipment for emergency response resources, principally for the aircraft and supporting laboratories involved in radiometric baseline surveys and rapid emergency response; and equipment to support the Environment, Safety and Health's program at the national laboratories.

Funds will also provide for radiation detection and data reduction equipment for use in aircraft, vans, all-terrain vehicles, and supporting laboratories. In conjunction with appraising DOE operations, equipment is needed for the acquisition and analysis of optical, infrared and microwave data. Such data indicates the extent and concentration of surface depositions due to effluents from DOE operations at both nuclear and non-nuclear facilities. In addition, the equipment funds requested will provide for test equipment and instrumentation in support of various analyses of environmental controls and for development of experiments in environmental, safety, and health-related studies. These equipment requirements, while important for research in the laboratories, also provide a valuable service in preparing information, data, and displays in solving environment, safety and health problems related to energy production.

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
VOLUME 3
BIOLOGICAL AND ENVIRONMENTAL RESEARCH

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Biological and Environmental Research

The budget for Biological and Environmental Research (BER) for FY 1984 is $170,200,000, a decrease of $18,020,000 below the FY 1983 level. Within this budget, $161,500,000 is for operating expenses, $7,700,000 for acquisition of capital equipment, and $1,000,000 is for general plant projects. The level of funding requested for FY 1984 will continue the research effort conducted in FY 1983.

Human health effects and environmental consequences from new and existing energy sources are concerns shared by the whole country. The Biological and Environmental Research program is the only long-term, multidisciplinary research effort in the Federal Government specifically devoted to the range of environmental and health issues anticipated in the expansion of existing energy technologies, or in developing new sources of energy. The goals of this research are to identify, before a technology is locked into place, the early and late effects, if any, on human health and the environment. Answers to these questions, if obtained early enough, will permit energy requirements to be met with minimum damage to human health and the environment, will prevent the expenses associated with unnecessarily restrictive regulations, and will avoid unanticipated constraints from arising at a later time.

This research program began 35 years ago with the establishment of the Atomic Energy Commission (AEC). The diversity of problems which were addressed led early on to the need for integrated, multidisciplinary research programs designed to look at ways of measuring radiation, understanding the major processes that move radionuclides back through the environment to man, and how radiation affects human health. Now, a number of years later, it is apparent that the same processes in the environment, the same interactions at the cellular level, and the same types of damage to DNA and other cell components are characteristic of other energy-related pollutants as well.

The nuclear mandate also led to the development and use of radiotracer techniques for unscrambling complicated life processes. Without these tools, the mystery of intermediary metabolism would not have been unraveled, the complexity of food chains would still be a matter of conjecture, and the rates at which sediments build and glaciers accumulate would be unknown. One of the major accomplishments of this research program is the savings in human pain and suffering resulting from advances made in the Nuclear Medicine program which have greatly reduced the need for exploratory surgery. Using isotopes and advanced imaging equipment developed by our contractors, doctors can treat diseases and examine a beating heart or a functioning brain to detect problems, if they exist, before they become life threatening. The ideas and inventions developed in this program have been transferred to and commercialized by industry, support long-term biomedical research and are now used in hospitals throughout the world.

Considerable progress has been made in understanding the health and environmental issues associated with energy technology developments, but more research is needed. Since most of the questions which need to be addressed are generic in nature, the BER program will focus on the long-term, basic and applied research needed to resolve these issues.

In FY 1984, the Cross Appalachian Tracer Experiment (CAPTEX) will use stable tracer gases to follow diffusion of pollutants downwind for over 1000 km, thus providing better information on the dispersion of pollutants and their effects, such as those associated with acid rain. Following up on recommendations of the National Academy of Sciences, environmental work in the energy-rich Arctic will continue. Continued effort will be given to the long term effects of low levels of radiation, still a major public concern. This investment in long term investigations of pollutant-effects on human populations and experimental animals will be continued. Research to better understand the mechanisms controlling biological responses to low exposures of neutrons, gamma rays and radionuclides will be intensified. Research on the effects of energy-related chemicals will continue to be reduced and redirected to address the more generic and long-term health and environmental issues of those chemicals associated with advanced energy technology and conservation options. With advances in synthesizing boron containing tumor-specific compounds, the promise of effective use of neutron capture therapy for cancer will be evaluated. The newly available high intensity beams of x-rays, ultraviolet radiation and neutrons will provide the opportunity to define the structure of key cellular and molecular structures of living organisms with a resolution not previously available.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Biological and Environmental Research
Environmental R&D
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Environmental R&D[a]				
Biological and environmental research:				
Operating expenses [b]	$193,434	$170,893	$170,893	$157,900
Capital equipment	11,700	11,977	11,977	7,700
Construction	4,000	2,000	2,000	1,000
Subtotal	209,134	184,870	184,870	166,600
Program direction:				
Operating expenses [c]	2,843	3,350	3,350	3,600
Subtotal	2,843	3,350	3,350	3,600
Total				
Operating expenses	196,277	174,243	174,243	161,500
Capital equipment	11,700	11,977	11,977	7,700
Construction	4,000	2,000	2,000	1,000
Environmental R&D	$211,977	$188,220	$188,220	$170,200
Staffing:				
Headquarters FTP/Total FTE's	57/60	50/56	50/56	48/54
Field FTP/Total FTE's	87/95	89/95	89/95	87/93
Total	144/155	139/151	139/151	135/147

Authorization: Section 103, P.L. 93-438, Section 203, P.L. 95-91

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[a] Comparability adjustments have been made to reflect transfer of the Life Sciences Research and Nuclear Medicine Application program to Biological and Environmental Research in the following amounts:

	FY 1982	FY 1983
Operating expenses	$ 45,386	$ 5,849
Capital equipment	2,000	0
Program direction	222	0

[b] A comparability adjustment has been made to reflect transfer of Bevalac facility operations to Nuclear Physics ($2,714,000 in FY 1982).

[c] A comparability adjustment has been made to reflect a transfer from Policy and Management ($150,000 in FY 1983).

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Biological and Environmental Research
(In thousands of dollars)

FY 1983 Appropriation	$188,220
o Reduce research capability to identify and measure toxic agents from nuclear and nonnuclear operations	- 3,303
o Defer expanding environmental research for alternative disposal strategies, and for defining ecological responses to natural and man-made stresses, eliminate land rehabilitation studies and restrict research to understand metabolic processes which accumulate or eliminate metals in plants and animals	- 2,970
o Delay chronic toxicity studies of energy-related chemicals; curtail support of how such chemicals cause cancer and other functional impairments; terminate research on biological effects of electromagnetic radiation	- 3,190
o Reduce basic research in molecular, cellular and developmental biology and postpone establishment of a Center for Structural Biology at Brookhaven National Laboratory	- 3,409
o Curtail quantitative studies on the human health effects of exposure to potential toxic agents associated with nonnuclear energy technology developments and conservation options	- 1,371
o Terminate all risk analysis studies to describe current uncertainties of the nature and magnitude of potential health and ecological impacts of emerging energy technologies	- 1,750
o Increase CO_2 research to develop a sound quantitative atmospheric carbon dioxide knowledge base to aid in energy policy decisionmaking	+ 3,000
o Increase in Program Direction funds for pay adjustments and related expenses	+ 250
o Defer purchase of capital equipment	- 4,277
Provide minimally adequate general plant project support	- 1,000
FY 1984 budget request	$170,200

	FY 1982	FY 1983	FY 1984 Request
A. Biological and environmental research	$211,977	$188,220	$170,200
1. Human health research	25,773	25,800	24,429
2. Health effects research in biological systems	67,350	58,486	51,887
3. Environmental research	29,227	25,565	22,595
4. Physical and technological research	36,149	29,292	25,989
5. Carbon dioxide research	11,971	9,000	12,000
6. Health and environmental risk analysis	3,978	1,750	0
7. Nuclear medicine applications	18,986	21,000	21,000
8. Program Direction	2,843	3,350	3,600
Subtotal, operating expenses	196,277	174,243	161,500
9. Capital equipment	11,700	11,977	7,700
10. Construction	4,000	2,000	1,000
Total, Biological and environmental research	$211,977	$188,220	$170,200

1. Human Health Research	$ 25,773	$ 25,800	$ 24,429

The budget request for the Human Health Research subprogram in FY 1984 is $24,429,000, a decrease of $1,371,000 below FY 1983. This budget will provide for improvements in the precision of our studies of nuclear workers, and continue the current program at a level which will ensure that useful results are obtained in a timely manner. Continued public concern over the health implications of low-level ionizing radiation necessitates increasing emphasis on obtaining more reliable information from studies on human populations exposed to such radiation. This can be done by increasing the size of the population under study and through more accurate assessment of exposures and competing risks (e.g., smoking).

The principal purpose of the Human Health Research subprogram is to determine whether exposure of humans to agents associated with energy production and use results in health effects, such as cancers and genetic defects. Since these diseases do not manifest themselves until years after exposure, this program supports several long-term epidemiologic studies. These investigations are supplemented by clinical and generic research aimed at uncovering the underlying mechanisms of energy-related disease processes. Historically, the major emphasis of the program has been on health effects from radiation exposure, but in recent years the program has been expanded to include selected, small scale research efforts on health effects related to other energy technologies.

Epidemiologic investigations require a long-term commitment of resources to fully assess the delayed consequences of chronic low-level exposures. In the past, information from BER-supported studies of populations exposed to ionizing radiation has provided the basis for the development of radiation protection standards. Ongoing epidemiologic studies continue to supply the basic information necessary to assure that these radiation protection standards provide maximum safety without being unnecessarily restrictive. For example, the first quantitative estimates of the relationship between radiation exposure and mutation rate in humans have been determined from studies of A-bomb survivors. Based on all available data, it has been estimated that genetic effects in human populations are considerably below the level predicted on the basis of rodent experiments with mice. As a result of an extensive reevaluation of the radiation doses received by Hiroshima and Nagasaki A-bomb survivors, it has been shown that neutrons were a minor component of the total dose at Hiroshima, while gamma exposures were higher than previously thought. With this new information, the two populations can now be treated as one to provide greater statistical reliability. However, differences between the two cities with regard to the extent of health effects previously attributed to the neutron component will now have to be resolved. Among other important findings obtained in the follow-up of Japanese A-bomb survivors is that a positive relationship exists between acute exposure to high levels (100 rad or more) of radiation and an increased risk of leukemia, multiple myeloma and cancers of the breast, lung, thyroid, esophagus, stomach, urinary tract and colon. These same exposures, however, do not appear to increase mortality from diseases other than cancer, a finding that confirms data obtained in animal experiments.

In addition to Japanese atomic-bomb survivors, the Human Health Research program supports epidemiologic studies on unique occupationally exposed populations. These include radium dial painters, nuclear shipyard workers, employees of DOE and DOE contractors, cyclotron workers, and Scottish oil shale workers. In one study of a population chronically exposed to very low levels of radiation (averaging less than 5 rem during employment) in the workplace, it has been shown that mortality from multiple myeloma is greater than expected. In another study, no increased risk of death has been found among workers with high plutonium body burdens; although an excess of intracranial tumors has been observed among workers at Rocky Flats as compared to rates in populations in surrounding counties. This finding is being investigated further.

Health effects of energy-related chemical pollutants are being investigated in a unique series of projects integrating both clinical and animal inhalation studies. Using a multidisciplinary approach, this research is focused on the effects produced by sulfur oxides, polycyclic organic materials and trace metals. One of the major objectives of this research is the development of noninvasive techniques for early detection and evaluation of pulmonary disease, whatever the cause. Results obtained will make valuable contributions to our understanding of the effects produced by exposure of workers or the general population to airborne pollutants. One specific accomplishment, derived from a new way of examining the cells in the sputum of uranium miners, is leading to the development of a technique which promises to have beneficial impact on the early diagnosis and treatment of lung cancer.

Energy-related human health research often involves studying humans who have been accidentally exposed to noxious agents or have been subjected to such agents for other unrelated reasons. Investigations of this type provide valuable information which has direct application to our understanding and interpretation of energy-related issues. In one such study, patients who have been treated with mutagenic chemicals or radiation for one disease have developed leukemia. Preliminary results of these studies indicate that the blood cells of the patients with leukemia contain a specific chromosomal rearrangement (pattern). If these results are consistent for all such patients surveillance techniques using chromosome alterations as biological markers for early warning of possible latent disease development appear to be promising.

Spontaneous and induced mutations at a given gene locus are rare events; therefore, it is difficult to determine the effects of exposure to low levels of chemical mutagens or radiation in human populations or experimental animals. Nevertheless, it is important to develop sensitive techniques for such measurements so that regulatory bodies can have valid data to set exposure limits for genetic hazards. In a long term study to measure mutation rates in an exposed human population, the frequency of mutations in genes that control 35 different blood proteins are being determined in the children of survivors of the atomic bombings in Japan. Results to date indicate that the mutation rate in the children of the exposed population are not significantly increased above the spontaneous rate of mutations. These investigations are laborious and expensive; however, new methods are being developed for detecting mutations directly from DNA measurements and for increasing the number of gene controlled proteins from thirty-five to several hundred which can be measured simultaneously for gene mutations.

	FY 1982	FY 1983	FY 1984 Request
2. Health Effects Research in Biological Systems.......	$ 67,350	$ 58,486	$ 51,887

This budget requests $51,887,000 for Health Effects Research which is a decrease of $6,599,000 below the FY 1983 level. This funding level will permit continuation of an integrated network of biological research that provides experimental data, theoretical models, and predictive capabilities needed to fill gaps in knowledge and reduce major uncertainties that severely limit our ability to estimate energy-related human health impacts.

This research program is broad and multidisciplinary in scope. It consists of both applied and basic research to identify potentially toxic physical and chemical agents associated with energy technologies and to determine, in experimental systems, the health implications of these agents. The research in progress is providing the kinds of data which can be used to quantify dose-response relationships in experimental systems, and basic molecular and cellular studies provide information which permits one to establish the fundamental concepts that allow use of these dose-response data to improve predictions of health impacts in exposed human populations.

Ideally, data from studies of human responses to toxic agents should be used to calculate human health risks. However, prospective experiments in humans cannot be performed for legal and ethical reasons, and existing human data are rarely adequate for making reliable health-risk estimates. Therefore, these data, obtained in epidemiological research, must be supplemented with information from studies of animals and other living systems. Experiments using molecular, cellular and whole animals are being used to study mechanisms by which toxicants induce health effects and for evaluating the many variables (e.g., level, rate and route of exposure) that may affect the ways in which humans respond to harmful environmental agents.

To obtain such data, BER research spans many levels of biological organization ranging from molecules to animal populations. Because no single animal species responds to toxic agents in the same way man does, a variety of species are studied for comparative purposes so that the effects observed in animals and in other experimental systems can be more meaningfully related to response in exposed humans.

Emphasis is placed on delayed toxic effects that are induced by long-term exposures to low concentrations of toxic agents. Three categories of health effects are investigated: cancer, genetic damage, and toxicity to functional systems of the body (e.g., nervous system, immune system, reproductive system, and developing fetus).

High priority in FY 1984 will be given to long-term research to define delayed biological effects induced in mammalian systems by low-dose radiation from internally deposited radionuclides and from external radiation sources. Included will be studies to develop a better understanding of mechanisms underlying radiation-induced delayed toxicity and to evaluate factors that modify the radiation response. Research on energy-related chemical toxicants will be conducted but on a smaller scale than that relating to radiation research. Basic molecular and cellular research will continue to use powerful new biophysical and genetic research tools as probes to improve insights into the structure, properties, and functions of cell proteins, nucleic acids, and other cell constituents that are targets of both physical and chemical pollutant action.

Carcinogenesis

Ionizing radiation as well as specific chemical agents that are associated with energy technologies are known to induce tumor formation. Research on carcinogenesis serves to identify and quantify energy-related cancer risks in experimental biological systems and to improve our understanding of cancer and the manner in which it is produced.

Empirical research in radiation carcinogenesis emphasizes quantitative evaluation of cancer risks associated with exposures to low-doses of radiation from external radiation sources and from radionuclides deposited in body tissues. Of major importance are a series of ongoing lifetime studies of cancer in dogs exposed to plutonium, other transuranic elements and long-lived fission products by inhalation, ingestion, or injection. In such research, careful work on metabolism and internal distribution of radionuclides is required to determine the radiation dose delivered to critical organs so that one may develop cancer risk models needed for the assessment of health impacts associated with the continued development of nuclear energy technology and defense program needs.

Neutron radiobiology, which is of increasing importance because there is no human data base, is under study at several DOE laboratories. The JANUS reactor at the Argonne National Laboratory, a unique and valuable national resource which can provide neutron exposures with minimum contamination from gamma rays, is being used to investigate mechanisms of cancer induction both in experimental animals and in mammalian cell systems. This work has demonstrated that repeated low doses of neutrons, delivered in small fractions, produce a larger number of tumors or transformations of cells from the normal to malignant state than an equivalent total neutron dose delivered over a short period of time. This response contrasts sharply with biological responses induced by x- or gamma radiation exposures. Fractionation of x or gamma ray exposures reduces the magnitude of the radiation effect, indicating that repair of molecular damage occurs under such exposure conditions.

The study of cancer risks posed by energy-related chemical agents has represented a formidable undertaking because of the great variety of organic and inorganic chemicals that must be considered. To date, high priority has been given to research specifically designed to identify chemicals in complex mixtures that can produce latent biological effects. As a result of these investigations on complex chemical mixtures, it has been shown that a relatively small number of chemical compounds, polycyclic aromatic hydrocarbons, produce most of the biological damage in simple test systems. Longer term research to determine the mechanisms involved in tumor production and the dose-response relationships following exposure to these compounds, as well as with the complex mixtures in which they are found, will continue to be supported.

It has been known for many years that tissues of the body can transform chemical carcinogens to harmless products that are excreted from the body. In some cases, however, metabolic processes can activate the chemical, producing a more reactive chemical molecule that can bind to DNA molecules, and transform the cell from a normal to a malignant state.

In FY 1984, research on cancer risks of low-dose radiation will receive top priority. Long-term animal studies and fundamental research on mechanisms of radiation carcinogenesis will be continued. Emphasis will also be placed on generic research to elucidate metabolic pathways of chemical carcinogens (activation and detoxification), mechanisms of tumor initiation and promotion, and effects produced by combinations of energy-related chemical agents. Generic, long-term studies in animals will also be conducted to define and quantify cancer risks from specific energy-related chemical agents.

Mutagenesis

To understand how heritable changes result from exposure to radiation and energy-related chemical agents, investigations of mutagenesis are carried out on several experimental levels. The research program emphasizes the identification of classes of mutagens, correlations of mutation frequency with exposure level, the development of methods for the detection of mutations and the definition of genetic damage and repair at the molecular level. Importance is also placed on evaluating the role of mutagenesis in the production of cancer. Recent advances in molecular biology, including recombinant DNA and gene transfer techniques, provide powerful tools which are being exploited to clarify gene structure and expression and how genes are altered by mutagenic agents. The research supported in this program provides information needed to evaluate mutagenic risk associated with energy-related activities and currently supports a large number of key investigators in mutagenesis research.

The BER mutagenesis research effort includes one of the world's premier programs in mammalian genetics. Over the years, numerous results have been published from experiments designed on the genetic effects produced by very low radiation doses and dose rates in the reproductive stem cells of male and female mice. This information has been used to estimate genetic hazards of radiation in man. Research on radiation effects will continue to be supported to determine the frequency and nature of changes that are produced in single genes and in chromosomes.

Data obtained in the ongoing research program have demonstrated that mutagenic activity contained in complex mixtures of hydrocarbons, as measured with simple biological test systems, is concentrated in a small number of chemical compounds and has established the need for characterization of the precise chemical nature of the damage, and an evaluation of the role of DNA repair processes in enabling the organism to cope with such changes. Based on available data, it is clear that living cells have developed a wide variety of ways to correct damage to their genetic material, and proposed research will provide more definitive information on the regulation of gene expression and its modification by agents which interact with the genetic material.

In FY 1984, increased emphasis will be placed on new molecular biological approaches to the study of mammalian genetics, on studies of the genetic effects of neutron irradiation, and on new approaches to study mechanisms of radiation-induced damage.

Systems Damage

In addition to acting at the gene level to induce cancer or mutations, radiations and toxic chemicals can induce functional disorders in sensitive target organs, such as the nervous system, the lungs, the reproductive system, and the developing embryo and fetus. Research is being conducted to identify, evaluate, and quantify those systemic effects which are severe and persistent.

In general, large doses of ionizing radiation are required to cause significant damage in most tissues and organs. Extensive data on radiation-induced damage in the brain, intestines, eyes, blood-forming systems, thyroid gland, and other functional systems are available in the older literature. Therefore, systemic toxicology is of relatively minor concern when one considers the effects of low level radiation exposures. However, certain cells (for example, both male and female reproductive cells, blood cell precursors and other rapidly dividing cells) are very susceptible to biological damage from small radiation doses, and work is currently in progress to define the radiosensitivity of these cell types.

Research is being conducted to compare the sensitivity of developing male reproductive cells in a number of mammalian species with different lifespans. Similar research on developing female reproductive cells of the mouse and subhuman primates, being carried out with gamma rays, beta particles from tritium, and neutrons has provided some unexpected results. It has been found that reproductive cells of the female mouse are killed by very low doses of gamma rays, that neutrons, typically more effective than gamma rays, are not significantly more effective in cell killing than gamma rays, and that beta particles from water labeled with tritium may kill these cells by a previously unrecognized mechanism. Research efforts will be continued to determine reasons for these unexpected findings.

In research with complex mixtures of energy-related chemicals (crude liquid from synthetic fuel processes), it has been found that catalytic hydrogenation of the mixture significantly reduces carcinogenic and mutagenic activity. The hydrotreated material has been found, however, to produce toxic effects on the nervous system and on the kidney in mice after chronic exposure through the skin. Further research is needed to determine the significance of these observations for human populations since skin contamination is an important route of exposure for workers in synthetic fuel plants.

Basic research related to systemic toxicity includes biophysical investigations to study the structure and properties of complex cellular macromolecules and organelles that play critical roles in normal tissue function and to determine how these cell components change when damaged. Much of this work utilizes special instruments such as the High Flux Beam Reactor (HFBR) and the National Synchrotron Light Source (NSLS) at the Brookhaven National Laboratory. In collaboration with university investigators, Brookhaven scientists are conducting investigations to understand the role of molecules and cellular organelles in protein synthesis, how nerve impulses are transmitted, and how ions are transported across cell membranes.

Basic molecular and cellular research is providing fundamental information about a specialized cell type, the macrophage, a remarkable and multifunctional cell that plays a uniquely important role in maintaining normal tissues in a healthy state and in providing protection against external stresses. Because of their obvious importance in the energy context, research is being supported to determine how macrophages function, what kind of signals they respond to in performing their many functions, and how they may be damaged by energy-related chemicals.

In FY 1984, support will continue to be provided for long-term basic research on the function of normal organ systems and the mechanisms associated with pollutant-induced damage of these important tissues.

	FY 1982	FY 1983	FY 1984 Request
3. Environmental Research............................	$ 29,227	$ 25,565	$ 22,595

The FY 1984 budget request for this program is $22,595,000, a decrease of $2,970,000 below the FY 1983 level. This request would continue to support the Department's basic environmental research program which is utilized by all energy technologies and the defense program.

The purpose of the environmental research program is to provide the information needed so that this nation can meet its energy requirements with a minimum impact on environmental quality. Basic knowledge is obtained on mechanisms which control and influence total ecosystems and the critical elements within them so that appropriate siting and operation of energy systems can be accomplished in a cost effective, environmentally safe, manner. To obtain this information base, a comprehensive research program in terrestrial and aquatic systems is conducted in different climatic regions and in offshore regions along the east and west coasts of the United States. The research is designed: (1) to identify processes of transformation and transport of energy-related materials, their rate of transfer, and their fate in the environment; (2) to determine movement of these materials through food chain pathways back to humans; (3) to predict effects of energy activities on critical ecosystems and the resiliency of the ecosystem to continued stress; (4) to manipulate damaged ecosystems to determine most beneficial methods of recovery; and (5) to identify processes used by plants and animals in degrading and detoxifying energy-related pollutants in the environment.

The research categories that are addressed by this program are: (1) the cycling of natural materials and energy derived products through the terrestrial and marine environments; (2) responses to stress of biological systems ranging from community level ecosystems down to the subcellular levels of a single species; and (3) development of new and improved mathematical and statistical research tools for use in ecology. Each of these research categories is described below.

Cycling Research

The research on cycling deals with the physical and chemical processes which move energy-related materials through ecosystems. The chemical forms of inorganic and organic compounds derived from energy activities are determined as they move through water bodies, soils, sediments, plants and animals. Availability of these materials to plants and animals is determined, including studies on their uptake through roots and leaves, and by animals which feed on plants as well as each other. Along with energy-related materials, cycling of elements and compounds necessary for the health of ecological systems under normal conditions is also determined. Coupling the cycling of pollutants with cycling of nutrients normally required by an ecosystem provides information needed to develop appropriate measures for control of energy materials.

Safe storage and disposal of residuals from the extraction, refining, or combustion of fuels is a pressing problem, particularly in energy-rich regions of the country. A strong focus of the environmental program in this area will be made in FY 1984. It is based on a research plan developed in FY 1981 with other Federal agencies, the national laboratories, and universities. Research will be conducted to understand soil-leachate interaction and transport of leachate materials through soils and surface and groundwater; to determine how microorganisms degrade or influence the behavior of these materials in the environment; and to understand the role of vegetation for sequestering energy-related pollutants. These data will be used to evaluate alternative disposal strategies in different physiographic provinces.

A modest research program in the marine environment was initiated in the 1950's because of the need to know the fate of radioactive fallout in the ocean and its pathways back to humans. Presently basic information is obtained on how energy-related materials derived from land are dispersed on the continental shelf and incorporated into the food chain. This program is based on understanding basic mechanisms within the marine ecosystem, and includes research on transport processes and sediment and water interactions of natural materials and contaminants by physical and biological mechanisms, as well as uptake of these materials in the food chain. This research has recently yielded important data which indicate that over half the annual production of algae in the northeast coastal area is transported across the shelf to the upper continental slope. Many energy derived particles and others of human origin are also carried along. This matter appears to create chemical conditions whereby dissolved metals and radionuclides are removed from the water column and are collected in the bottom sediments. In FY 1984, research will continue to determine the rate at which this large amount of material is removed from the near coastal zone, as well as its ultimate fate offshore.

Biological Responses of Ecosystems

To understand how natural populations withstand normal stresses as well as those stresses induced by energy-related activity, investigations on biological responses of ecosystems are carried out at several levels; on communities of plants and animals, at the population level of a single species, and on single cells of plants and animals. In studies of mixed communities, our long-term basic research paid off when it was used to develop master maps showing different sensitivities of environmental units in the Arctic. Based on information on the maps, user groups can determine the ability of each landscape unit to handle stresses resulting from increased vehicle traffic, oil spills, or construction. These sensitivity maps are being used to locate roads, workpads, pipelines, etc., in areas most resistant to such stresses while avoiding sensitive ecological areas.

A small program is being conducted in plants and invertebrate animals at the cellular level and is integrated with research in the Health Effects Research program. The studies on metal binding proteins in aquatic organisms have shown that simply measuring metal content in organisms is not a reliable indicator of toxicity or exposure to metal. Research will continue in order to understand the metabolic processes which accumulate or eliminate metals from the systems and the threshold beyond which the organisms can no longer handle additional inputs. Thus, it will be possible to predict exposure levels to which aquatic animals can be safely exposed. In another area, BER-supported research on plant metabolism shows that too much sulfur dioxide reduces the ability of plants to fix carbon dioxide. This is important since the buildup of sulfur dioxide in the air, already thought to be a factor in acid rain, may affect the rate at which carbon dioxide is accumulating in the atmosphere.

Theoretical Research and Statistical Techniques

The environmental program also supports, at a very modest level, theoretical research and the development of statistical techniques that are aimed at making ecological research in terrestrial, fresh water, and marine environments more quantitative. Theories on ecosystem stability, succession, and population dynamics are tested in models that are useful for predicting environmental impacts. Also, statistical techniques are developed to help design better experiments which provide the best data at lowest cost.

	FY 1982	FY 1983	FY 1984 Request
4. Physical and Technological Research.................	$ 36,149	$ 29,292	$ 25,989

This research program develops the physical information and techniques needed to understand the impact of energy-related agents on human health and the environment. The FY 1984 budget requests $25,989,000 for research in this program, which is a decrease of $3,303,000 below FY 1983.

A broad range of physical research activities comprise this program activity. Analytical chemistry research is concerned with the identification and quantification of chemical classes and compounds that are responsible for biological activity in energy-related materials. Atmospheric research develops transport models and investigates chemical transformation to improve our capability for defining short and long range dispersion of energy-related emissions. Measurement and dosimetry studies are designed to improve radiation and analytical instrumentation and to enhance health protection techniques. Finally, research into the physical mechanisms which underlie biological change upon exposure to energy-related agents provides insights needed to fully interpret radiation dose effect relationships.

Analytical Studies

This program seeks to find out which components of energy-related materials produce biological or environmental damage. Knowing which chemicals damage living organisms then permits the energy technology programs to adopt appropriate protective measures or to modify their procedures to reduce or even eliminate these biologically active materials. Chemical characterization of synthetic fuel materials will continue in support of biological studies on the carcinogenicity, mutagenicity and toxicity of these agents.

Studies of radon in the home have been motivated by concern about the increased radiation dose received by those who practice energy conservation. It is clear that weather stripping and other techniques lead to reduced air exchange which may increase the concentration of radon and, as a result, the radiation dose to the lung. Research is being conducted on radon sources, air exchange, properties of radon daughters and the development of models of energy deposition in the lungs to see how each influences the risk of lung cancer.

The High Altitude Sampling program (HASP) was initiated during the days of weapons testing to learn more about the distribution of radioactive debris in the atmosphere. The HASP effort requires aircraft to sample materials from 75 degrees North Latitude to the Equator at four altitudes in the lower stratosphere. In addition, balloon sampling is conducted at three stratospheric levels above the range of the aircraft. The collection and subsequent extensive analytical characterization of these samples provides data on a large number of radionuclides and a variety of nonnuclear atmospheric constituents. It continues today as the world's only regularly scheduled, upper atmospheric sampling program.

Atmospheric Sciences

This program involves field studies on the transport and dispersion of energy-related materials, as well as atmospheric physics and chemistry research. Most of the transport and dispersion research conducted in the past dealt with air circulation for short distances over simple, flat terrain. There has been an increasing recognition that current models and understanding of atmosphere processes are inadequate to address questions of pollutant dispersion in mountainous (complex terrain) areas. A theoretical and experimental program, Atmospheric Studies in Complex Terrain (ASCOT), addresses these problems in a research effort which is focused on energy-rich areas of the west. This activity will continue to be coordinated with research supported by EPA, NOAA and the Electric Power Research Institute.

A second major transport and dispersion study planned for FY 1984 is the Cross-Appalachian Tracer Experiment (CAPTEX). This research effort will furnish data for developing and validating long distance (1000 km) atmospheric dispersion models. CAPTEX will make use of newly developed, chemically inert atmospheric tracer gases, the perfluorocarbons, which can be inexpensively and accurately measured at concentrations of a few parts per quadrillion (10^{15}) parts of air. These tracers will be released in the midwest, tracer concentrations will be measured at various locations in the northeast and meteorological records will be obtained for the entire region. Model simulations of the expected dispersion will be developed and compared with the observed concentrations.

A second category of research will look at the physical and chemical characteristics of the pollutants themselves. This includes research on chemical transformation of energy-related materials, studies of the processes which remove pollutants from the atmosphere and deposit them on the earth's surface, and measurement of the rates of that deposition. Results of these experiments will provide information on the important, but poorly understood, phenomenon of "dry" deposition. Estimates from preliminary modeling indicate that dry deposition may contribute 50 percent or more of the total deposition which is collectively, if inaccurately, referred to as "acid rain." These efforts are part of the national program coordinated by the Interagency Task Force on Acid Precipitation. Results of these experiments are contributing to the U.S./Canada deliberations on Transboundary Air Precipitation.

Measurement and Dosimetry

This research develops new and improved devices to measure ionizing radiation and energy-related chemicals to assure that worker and public exposures are accurately measured and kept as low as possible. High priority is being given to the development of new mixed field beta-gamma and neutron-gamma detector systems for both surveys and personnel monitoring. Related research is improving measurement of alpha-emitting radionucludes by x-ray spectrometry. Also, better methods of predicting dose to individual organs from either internal radionuclides or exposure to external radiation fields are being developed. A highly successful program for the development of cost effective standardized modular systems for radiation research is coordinated through the National Bureau of Standards.

Instrumentation research is also conducted to develop new techniques for detecting and measuring materials associated with advanced energy production processes. Lasers can be used for making highly sensitive and selective measurements. In particular, a new technique for element analysis, resonance ionization spectroscopy, developed at Oak Ridge National Laboratory, has the sensitivity to detect individual atoms. It is being used for detecting pollutants, for fundamental physics, and has even found some applications in oceanography. Laser-excited fluorescence techniques, in which the sample is embedded in a low temperature matrix, have been particularly useful for detecting polycyclic hydrocarbons. Using this technique, scientists at the Ames Laboratory have identified and measured specific carcinogens in extremely complex organic mixtures.

Another component of the measurement program is devoted to the development of advanced instruments for biomedical research. These include electron microscopes, flow cytometers, and advanced optical detectors. In addition, an x-ray beam line and a low angle x-ray scattering station for biophysical research at the Brookhaven National Synchrotron Light Source (NSLS), now under construction, will be completed by the end of FY 1983. A vacuum ultraviolet spectrometer system has been developed and installed on the U[ring of the NSLS. These advanced instrumentation systems will be used for biomolecular structural studies supported by the Health Effects Research subprogram.

Physical Mechanisms

This research category covers two major areas: fundamental physics and chemistry of energy-related chemical interactions in the atmosphere, and the physical mechanisms governing the interaction of ionizing radiation with biological matter.

The first area is closely integrated with the atmospheric sciences program discussed earlier. Laboratory studies provide the rates of chemical reactions and physical transformations that are required for the computational modeling to predict the behavior and fate of pollutants in the atmosphere. The size, composition, and surface characteristics of small particles determine how they are deposited, their interaction with receptors, and their potential health effects. To date, this research has produced needed data on gaseous reactions, on the formation of clusters of both like and unlike molecules, on the growth of such clusters, and on their persistence in the environment.

In FY 1984, research will focus on the complex physical characteristics and chemical composition of particles, on their role in chemical reactions and on their interactions with carcinogens in the air.

Radiological physics research addresses the early stages of radiation interaction with living cells to determine mechanisms of energy deposition; the resultant formation of highly reactive chemicals and the interaction of these chemicals with the molecules of living cells that subsequently, sometimes years later, lead to biological effects. These physical and chemical interactions occur in a few millionths of a second, and the spatial patterns of energy deposition are less than a micrometer across. The type and energy of radiation and the conditions under which the energy is deposited, determine the wide range of effects observed.

Considerable progress has been made in relating the initial physics of radiation exposure, both experimentally and with computer models, to the biological effects. In FY 1984, emphasis will be placed on investigations to relate energy deposition to the early chemistry that occurs near the "track" produced by an ionizing particle. This understanding will, in turn, permit development of models to predict the effects of low-level radiation on humans.

Important to each of these areas is an understanding of molecular structure and energetics. Fundamental research will therefore address the absorption and emission of energy by molecules; and the changes in molecular behavior caused by changes in the energy content and structure.

	FY 1982	FY 1983	FY 1984 Request
5. Carbon Dioxide Research	$ 11,971	$ 9,000	$ 12,000

The goal of the Carbon Dioxide Research program is to develop a sound, quantitative atmospheric carbon dioxide (CO_2) knowledge base to aid in energy policy decision making. This goal involves the following objectives: improve knowledge of the carbon cycle, improve estimates of future atmospheric CO_2 on climate, improve understanding of the direct CO_2 effects on plant productivity in natural and agricultural systems, develop and verify methods for the first detection of CO_2-induced climate change, identify, characterize and define indirect effects, define possible mitigation strategies and possible energy policy options.

Recent accomplishments of the Carbon Dioxide Research program include: the detection of a change in the rate of annual carbon dioxide emissions (from 4.6% to 1.9%) which, if sustained, is very important to the CO_2 issue because atmospheric buildup of CO_2 will occur more slowly; the determination of a most recent-age measure of CO_2 in ice (180 to 1000 years ago) of about 270 parts per million. This is extremely important because it represents a preindustrial benchmark for estimating CO_2 from fossil and possibly biospheric sources. The data collection phase of a major oceanographic research program, the North Atlantic Study of Transient Tracers in Oceans (TTO) was completed. The TTO data set will be useful in coupled ocean atmosphere models of climate response to increased atmospheric CO_2. In addition the completion of a global map of world ecosystem and vegetation carbon can be used to define the role of the terrestrial biosphere in the global carbon cycle and to illustrate human influences on that cycle. The coupling of the National Center for Atmospheric Research's world dynamics ocean model to their atmospheric global circulation model is another major accomplishment. Application of the coupled model over the next two years to the CO_2 issue represents a major step towards more realistic climate modeling.

The FY 1984 budget request for the Carbon Dioxide Research program is $12,000,000, an increase of $3,000,000 above the FY 1983 level. This increase will allow program expansion to include vegetation change estimates from satellite data, expanded measurements of total carbon change in oceans, partial support of the international satellite cloud climatology program, expanded effort in the first detection of CO_2-induced climate change, data on CO_2 fertilization on two additional crops (wheat and corn), expanded effort on the indirect effects of climate change including the West Antarctic ice sheet issue, upgrading of the carbon dioxide data management and network system and the start of a comprehensive analysis of mitigation and control of the effects of CO_2.

The specific objectives of the carbon cycle aspects of the Carbon Dioxide Research program in FY 1984 are to maintain a data base on CO_2 emission and changes in atmospheric CO_2; develop CO_2 measurement standards and estimate CO_2 of past atmospheres by 1985; estimate by 1985 the influence of biosphere on atmospheric CO_2 from biomass and soils statistical data; complete by 1985 the data collection and modeling of North Atlantic Transient Tracers in Oceans; provide improved measures of fossil CO_2 in ocean water; continue the data analysis and integrative modeling of global carbon cycle; and by 1985 develop two and three dimension models of ocean circulation to improve calculation of fossil CO_2 removal by oceans.

Objectives of the climate effects aspects of the program are to continue the strategy for the first detection of CO_2-induced climate change and subsequent climate data analysis. The natural interannual, seasonal, and monthly variability will be established. Continue data collection support for the international satellite cloud climatology program (a joint program with NASA and NOAA). The complete data set will be available in 1988, but data will be available to the climate modelers throughout the program.

Objectives of the vegetative effects aspects of the program are to complete the data collection, develop and validate models by 1985 of CO_2 fertilization of soybean growth and productivity.

Objectives of the indirect effects aspects of the program are to continue to analyze the effects of climate change and increased atmospheric CO_2 on agriculture, water resources, and human health: initiate a program to map the West Antarctic ice sheet by remote sensing methods to help answer the question of what the response of the West Antarctic ice sheet to CO_2-induced climatic warming will be.

Objectives of the other components of the program are to upgrade the carbon dioxide data management and network system from the prototype phase to fully operational in 1984 to support the nation's carbon dioxide climate research effort by providing a focal point for the compilation and distribution of CO_2-related information under systematic quality control; expand the comprehensive investigation and assessment of the mitigation and control of the effects of CO_2 increase in the atmosphere. From the findings and assessments, it is planned to develop conceptual processing schemes for removing, recovering and disposing of captured CO_2. A mid-program statement of findings report will be prepared in 1985 to delineate what is known, unknown and uncertain about atmospheric CO_2 and possible CO_2-induced climate change and the response of vegetation to rising CO_2. This effort will provide a better understanding about long-term implications of CO_2 and will serve to redefine the research necessary to provide definitive recommendations for policy options as to fossil fuel usage or proven mitigation strategies expected to be available in the early 1990's.

	FY 1982	FY 1983	FY 1984 Request
6. Health and Environmental Risk Analysis	$ 3,978	$ 1,750	$ 0

The objective of this program was to support the formulation and management of environmental research by providing realistic analyses, based on current information, of concerns regarding potential long-term health and ecological impacts of advanced energy technologies. By identifying critical sources of uncertainty underlying potential environmental concerns, these analyses assist in formulating and managing a program of environmental research focused on identifying the more critical research data needs.

In this program, technology specific and generic health and environmental concerns associated with energy technology processes were analyzed, and Health and Environmental Effects Documents (HEEDs) have been prepared which describe current knowledge and uncertainty regarding the nature and magnitude of potential health and environmental effects. In addition, improved methodologies have been developed for reducing uncertainties in risk analyses.

A number of documents have been produced and are in the process of being reviewed at this time, and will be completed in FY 1983. With the completion of these documents in FY 1983, this assessment program will be terminated.

	FY 1982	FY 1983	FY 1984 Request
7. Nuclear Medicine Applications.......................	$ 18,986	$ 21,000	$ 21,000

The budget request for FY 1984 is $21,000,000. This level of funding allows research activities on the production of new radioactive and stable isotopes and radiopharmaceuticals, and the initiation of experiments to determine the clinical feasibility of neutron capture techniques in cancer therapy.

The objective of the Nuclear Medicine research and development subprogram is to exploit the expertise of physicists, radiochemists, engineers and medical specialists to create new medically useful radioactive isotopes, radiochemicals, radiopharmaceuticals, and stable isotopes, and the instrumentation and methods needed to make and use them. After clinical feasibility for a given technology is established, the technologies are turned over to the private sector or to other agencies to fund research on specific disease processes. Some cancer therapy is done by certain national laboratories because of their unique facilities.

In general, nuclear techniques have changed the practice of medicine. They now allow the physician to observe not only the structural abnormalities, but also the function of specific organ systems in the human body. Furthermore, they have reduced the need for invasive procedures and exploratory surgery, made hospital stays shorter, less painful and dangerous, and have greatly expanded the physicians arsenal in his fight against disease and human suffering. The DOE Nuclear Medicine program has played a major role in developing the technologically advanced diagnostic procedures used routinely in hospitals today. In addition, the program's contractors designed and built the prototypes for most of the diagnostic instrumentation now used in nuclear medicine. These include the positron emission trans-axial tomographic (PETT) scanner, gamma camera, and the rectilinear scanner. High purity stable isotopes of carbon, oxygen, and nitrogen are also produced in large quantities for use in medical, biological, and agricultural research. These stable isotopes help detect diseases and make it possible to follow the behavior of pollutants in man. Since there is no danger from radiation, stable isotopes are particularly useful for diagnostic procedures in infants and pregnant women.

This budget will permit the Nuclear Medicine research and development program to continue developing new and better techniques for the improved diagnosis and treatment of human disease. An expanded program of stable isotope research is planned. High purity stable isotopes of carbon, oxygen, and nitrogen will continue to be produced for use in medical, biological, and agricultural research. Compounds labeled with stable isotopes will be used in sensitive tests for disease detection, and to study behavior of pollutants in humans and the environment. In the next year, work will also begin to develop metabolic "imaging" of organ dysfunction and diseases, methodology for assessing the viability of organs for transplant, monitoring various treatments by actually measuring different chemical reaction rates in the body as they occur, and even detailing metabolic compartmentalization and control.

Feasibility trials of neutron capture therapy for chemoradiotherapy of cancer will be initiated. This therapeutic approach is attractive because of recent advances in the labeling of tumor-seeking compounds with the stable isotope, boron-10. When irradiated with low energy neutrons, these boronated compounds produce alpha particles which deliver high radiation doses to areas only a few cells in diameter. Thus, the concentration of boron in the tumor permits selective irradiation of cancer cells, preferentially killing them with minimal harm to normal cells.

In FY 1984, several ruthenium-labeled radiopharmaceutically will be tested in the laboratory and then on humans for studying protein metabolism in various organs. Iron-52, which has a short half-life, will be produced, and used to trace the movement of iron in patients with blood forming disorders.

New compact and mobile generators will be developed to increase the availability of certain short-lived radioisotopes without the need for costly accelerators. For example, iron-52 will be used to generate manganese-52m, a short-lived positron emitter, which is useful for emission tomography. In addition, animal studies will be well underway and preliminary clinical trials started for evaluating a lanthanum-134 generator if useful applications of lanthanum radiopharmaceuticals, such as improved bone imaging, can be confirmed. Considerable interest has been expressed by the nuclear medicine community for the increased availability of iodine-123. To meet this need a generator-iodination kit has been developed and its usefulness will be evaluated in several different clinical laboratories.

The production of new radioactive labeled pharmaceuticals is continuing. Investigations are underway to determine the distribution of particulate matter in the body using irradiated carbon particles. New initiatives will be implemented to use chlorine-39 for electrolyte evaluation, to use labeled coal dust and fly ash to determine the distribution and behavior of these particles in living organisms, and to investigate the utility of tin-117 for both bone imaging and radiotherapy.

	FY 1982	FY 1983	FY 1984 Request
8. Program Direction			
Operating Expenses	$ 2,843	$ 3,350	$ 3,600
FTP/Total FTE's	57/60	50/56	48/54

The FY 1984 budget request for Biological and Environmental Research Program Direction is $3,600,000, an increase of $250,000 above the FY 1983 level. These funds provide for the salaries, benefits, travel and related personnel costs for the 54 full-time equivalents (48 full-time permanent, 6 other than full-time permanent) required to administer this program. This staffing level represents a decrease of 2 full-time equivalents from the revised FY 1983 level. The requested funding will provide for the full-time equivalents and normal increased personnel costs such as within-grade and merit increases, benefits and other support costs associated with the program. The funding request also reflects the impact on average salaries of the FY 1982 and FY 1983 pay cap increases and two general pay increases in FY 1982 and FY 1983.

This staff directs, manages, and supports a comprehensive multidisciplinary research effort designed to understand the long-term health and environmental effects associated with the increased production and utilization of this Nation's domestic energy resources. The program covers research into the fundamental processes governing chemical and radiation interaction in biological systems, research on the dose-effect relationships for differing exposure conditions, basic biological research for understanding and predicting the health and environmental effects of energy-related pollutants on living organisms, and research and development on new applications of nuclear technology to clinical medicine. In carrying out these responsibilities, the staff provides guidance and support for approximately 900 active research projects (reviewing and evaluating many more throughout the proposal selection process), develops long-range program plans based on their assessment of the scientific needs of the program and agency priorities, and conducts major reviews of Biological and Environmental Research sponsored programs at laboratories and universities. This requires a close liaison with other DOE programs, other Federal agencies and the scientific, academic and industrial communities. This staff also provides the administrative and program support services required to carry out the program.

The FY 1984 request will provide the minimum staffing resources required to maintain the varied professional scientific disciplines necessary to evaluate efforts carried out in the multidisciplinary laboratories, 10 specialized facilities and over 150 universities, hospitals and other research institutions. This staff will also support and evaluate the planned biophysical experiments to be started in FY 1984 at the National Synchrotron Light Source Facility at Brookhaven National Laboratory to exploit the availability of high intensity X-rays for protein structure analysis and high intensity ultraviolet light for nucleic acid studies, and will ensure the timely development and technology transfer of improved techniques and applications to energy technology and clinical medicine.

	FY 1982	FY 1983	FY 1984 Request
9. Capital Equipment....................................	$ 11,700	$ 11,977	$ 7,700

The capital equipment request for this program is essential for pursuing the diverse areas of research on health and environmental issues associated with the numerous energy technologies under consideration and to continue high quality research and advances in the development of nuclear medicine technology.

Examples of capital equipment needed at laboratories, contractors and universities to support research include: scanning electron microscope, liquid chromatograph, liquid scintillation counter, spectrometer, amino acid analyzer, environmental chamber, infrared analyzer, animal caging, etc. Many of these items are interchangeable among various research efforts, and therefore can serve numerous experiments over a period of time, making them very cost effective.

The necessity to maintain state-of-the-art capability and to replace older instruments whose continued use and operation is no longer cost effective, are other considerations supporting this request. The majority of these items fall into the range of under $50,000, but are of great importance for carrying out detailed health and environmental research.

	FY 1982	FY 1983	FY 1984 Request
10. Construction	$ 4,000	$ 2,000	$ 1,000

Construction funds of $1,000,000 are requested in support of the biological and environmental research program's general plant projects.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET SUBMISSION

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Environmental R&D
Biological and Environmental Research

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects

2. Project No.: 84-ER-133

3. Data A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate:
Date: $ None

6. Current cost estimate: $1,000
Date: 1/83

7. Financial Schedule:

Fiscal Year	Obligations	Costs FY 1982	FY 1983	FY 1984	After FY 1984
Prior Year Projects	XXXXXXX	$ 1,432	$ 1,000	$ 440	$ 2,121
FY 1982	$ 3,000	40	450	560	1,950
FY 1983	2,000	0	500	400	1,100
FY 1984	1,000	0	0	250	1,750

8. Brief Physical Description of Project:

This estimate is for minor new construction and other capital alterations, additions, and retirements to land, buildings, and utilities systems. The estimate also includes the cost of installed equipment which is an integral part of the general plant subprojects.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects 2. Project No.: 84-ER-133

8. Brief Physical Description of Project (continued):

Although it is difficult to detail this type project in advance, all of the subprojects identified below are under consideration. In general, the estimated costs for each of the subprojects are preliminary in nature, with a project limitation of $1,000,000, and primarily indicative of the size of the project. The continuing review of our requirements will result in some of the projects being changed in scope; it will also result in other projects being added to the list with the necessary postponements of some now listed, all depending on conditions or situations not apparent at this time. These general plant projects will provide facilities for conducting critical research programs, contribute to greater efficiency, eliminate health and safety hazards, and will reduce maintenance and operational costs.

The estimate is based on requirements by office as follows:

Summary by Office	
Albuquerque Operations Office	$ 500
Chicago Operations Office	50
Oak Ridge Operations Office	50
San Francisco Operations Office	250
Savannah River Operations Office	100
Washington Headquarters	50
Total	$1,000

9. Purpose, Justification of Need For, and Scope of Project:

The following is a tentative tabulation of the major projects to be performed at the various laboratories under the operations office listed.

Albuquerque Operations Office	
Inhalation Toxicology Research Institute	$ 250
Primate housing modification	
Miscellaneous small projects	
Los Alamos National Laboratory	250
Analytical sample preparation laboratories	

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects

2. Project No.: 84-ER-133

9. Purpose, Justification of Need For, and Scope of Project (continued):

Chicago Operations Office University of Rochester Miscellaneous small projects	$ 50
Oak Ridge Operations Office Oak Ridge Associated Universities Upgrading of biochemical and radiochemical laboratories	50
San Francisco Operations Office Lawrence Livermore National Laboratory Halon Fire protection system Field equipment staging facility	250
Savannah River Operations Office Dupont Miscellaneous small projects	50
University of Georgia Miscellaneous small projects	50
Washington Headquarters This estimate covers necessary alterations and repairs at universities or nonprofit institutions in support of programmatic needs.	50

10. Details of Cost Estimate:

Based on preliminary conceptual design.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

MAGNETIC FUSION

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Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Magnetic Fusion Energy

The Magnetic Fusion Energy program is one of the nation's major research efforts to develop a new source of energy. Long recognized as one of the few long-term energy source options, fusion has the potential of becoming a principal energy source for the nation in the next century. This potential is based on a number of important and attractive features. These include such characteristics as a vast fuel reserve that is inexpensive, readily available and free from threat of embargo, and the environmental and safety aspects of fusion reactors which also appear to be reasonable and acceptable.

While electricity is an obvious end use for fusion, other uses are possible as well. These include breeding fissile material for fission plants, generating very high grade heat which has many industrial applications, and the direct production of synthetic fuels.

There is also a wide ranging impact from high technology development efforts in fusion within the U.S. Fusion is serving as a technology driver in fields as diverse as superconducting magnets, high power accelerators and radio frequency systems, advanced materials development, and mathematical methods for computers. Fusion makes important contributions in advancing electronics, computer control systems, optics and many other areas.

The ultimate goal of the program is to develop the basis for an environmentally sound and economically competitive fusion system. Because of both the cost and the long term nature of this highly complex scientific and engineering program it is appropriate that fusion receive federal support. As indicated in the National Energy Policy Plan "The Federal Government recognizes a direct responsibility to demonstrate the scientific and engineering feasibility of fusion." In fulfilling this responsibility we have attempted to identify the best way to develop this new field of science and technology in the most economical way to ensure that it provides the base of scientific understanding and knowledge from which sound judgments can be made on the most economical and practical way to develop this last remaining energy source.

The current plan is to carry out a three phase program. The first phase is to achieve scientific feasibility in the near-term. As confidence has grown for a successful demonstration of scientific feasibility the program has been moving into the product definition phase. The objective of the product definition phase is to demonstrate a reactor concept which is credible in the scientific, engineering and economic sense. Following a successful product definition the final phase will be one of product development in which the data base required for construction of commercial fusion power reactors will be developed.

In carrying out this plan the U.S. program is complemented by other strong national programs and an international program of cooperative activities. The U.S. program has exercised a role of international leadership in this endeavor and has benefited significantly from this active international cooperation.

Presently, the tokamak is the most developed confinement concept followed by the more recently developed tandem mirror. Both are ready to attempt production of reactor-grade plasmas by virtue of the existing tokamak TFTR facility and the tandem mirror facility (MFTF-B) under construction. The program also maintains an effort to develop new, improved concepts at a lower level of funding.

Several of the currently operating tokamak experiments have achieved reactor-level plasma temperatures and near reactor level confinement times. The major new tokamak facility, the Tokamak Fusion Test Reactor, will start operation early in 1983, and in

1986 will be the first fusion device in the world to attempt to demonstrate energy breakeven (i.e., energy produced in the plasma is equal to the energy put into the plasma). TFTR and its potential upgrades will use deuterium and tritium fuel to provide an introduction to the physics and engineering problems of alpha particle confinement, the production of high energy neutrons, remote handling requirements and other engineering issues. In so doing, TFTR will demonstrate near reactor-scale components.

In the mirror program, reactor level temperatures have been achieved. TMX has now established the basic principles of the tandem mirror concept without thermal barriers and Tandem Mirror Experiment (TMX) upgrade will demonstrate the principles of the thermal barrier tandem mirror concept in FY 1983. The Mirror Fusion Test Facility - B (MFTF-B), currently under construction with a scheduled 1987 completion date, will investigate the physics and engineering principles of reactor-level tandem mirrors. Plasma conditions should be obtained approaching energy breakeven using hydrogen and deuterium fuels. Near-reactor size components such as superconducting magnets, plasma heating systems, and integrated instrumentation and control systems will also be documented.

Considerable progress has also been made on concept improvement research. This research includes work on the Elmo Bumpy Torus (EBT), the Reversed Field Pinch (RFP), Stellarators and Compact Toroids. These efforts provide important insights and have contributed significantly to basic understanding of the behavior and control of high temperature fusion plasmas and to improvements in the mainline tokamak and tandem mirror reactor embodiments.

The fusion engineering development program has developed components and subsystems for present experiments and is now developing critical components and technologies for next generation devices. Examples of the former are positive ion neutral beam injectors and high frequency, high power, radio frequency tubes; examples of the latter include the development and testing of large superconducting magnets in the Large Coil Test Facility (LCTF) and demonstration of tritium handling technology in the Tritium System Test Assembly.

The Magnetic Fusion Energy budget for FY 1984 is $467,000,000. The Magnetic Fusion Energy budget request provides the necessary support for developing the two mainline concepts, tokamaks and tandem mirrors, as well as the associated engineering development. In addition, funding will be provided for supporting experiments on the EBT, compact toroids and RFP alternate concepts and smaller scale efforts on the stellarator. The FY 1984 program that is being proposed will allow us to address the key physics issues that need to be resolved in order to proceed confidently with the construction of an engineering test reactor. The critical reactor design and technology issues for such a reactor will also be explored. These technology issues can be grouped in the areas of plasma production technologies, nuclear technologies, and system technologies. The existing fusion program facilities and those now being fabricated will be used to attack the key technical issues of confinement physics and engineering development. Some of the key facilities will be modified to incorporate advanced performance features to make maximum utilization of their potential contribution.

The fusion budget is organized into five interrelated functional areas that form the basis for a unified and balanced effort in conducting the R&D necessary to define a practical fusion product. The Confinement Systems (CS) and Applied Plasma Physics (APP) subprograms, working in conjunction, provide the physics basis for the MFE program.

Experiments in the Confinement Systems subprogram are directed at improved performance of confinement parameters: higher temperatures, longer confinement time, higher plasma density, higher beta, steady state plasma discharges, and improved impurity controls. In the toroidal area some facilities will either be shut down or redirected to focus efforts on demonstrating confinement, beta values and reactor-relevant current drive that are scalable to an Engineering Test Reactor (ETR). Experiments on current drive which lead to a steady state reactor will be carried out at high power levels on Alcator C. More exploratory studies to develop new current drive techniques will be conducted on PLT, where ICRF heating development will also continue. With the shutdown of the Poloidal Divertor Experiment (PDX) in FY 1983, impurity and disruption control studies will be pursued on ISX-B in FY 1984. TFTR will provide information on scaling with size while Doublet III will test improvement of power density (beta) with shaping.

The Tandem Mirror research program will focus on investigating the physics of the thermal barrier and testing a negative potential operating mode for tandem mirrors. The TMX-Upgrade experiment will be the primary mirror device operating. In addition, completion of construction and initial operation of the TARA device at MIT is scheduled for late 1984. At the proposed funding level, the attendant programmatic considerations of timeliness and technical priority do not allow us to proceed with the construction of the EBT-P project in FY 1984.

Theoretical programs in the APP subprogram seek to interpret and predict the results of confinement experiments and use this understanding for design of improved experiments and reactors. Small experiments in the APP subprogram will investigate specific issues of tokamak or mirror physics and also develop advanced diagnostic techniques for use in confinement experiments. APP experiments will also investigate concept improvements with potentially attractive reactor characteristics.

Based on the program's physics results and projections, the Development and Technology subprogram will develop components and systems for use in near and mid-term fusion experiments, perform engineering design studies of practical reactor systems, and investigate critical technologies required by these systems to ensure their ultimate technical feasibility. These fusion power reactor designs serve to identify component and system developments which must be undertaken to prepare the technical base for eventual commercialization of fusion.

In carrying out the assignments of these subprograms, needs for major new facilities are identified from time to time. The Planning and Projects subprogram is responsible for constructing these major new facilities and conducting project specific research and development activities. General Plant Projects (GPP) and General Purpose Equipment (GPE) are also funded in this category. The major effort in FY 1984 is associated with construction of the Mirror Fusion Test Facility - B project and fabrication of auxiliary components for this facility. Limited funding is provided to initiate a joint international cooperative effort on the Fusion Materials Irradiation Test facility. Funding is also provided for continuation of the TFTR flexibility modifications to allow self heating of the plasma as a result of burning fusion fuel, deuterium and tritium.

The Program Direction subprogram provides the funding to cover salaries, benefits, and travel expenses associated with the requirement of staffing the Headquarters Office of Fusion Energy staff. The FY 1984 budget has been developed to provide the proper balance among these various program activities within the overall proposed funding level for magnetic fusion.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Magnetic Fusion Energy
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Magnetic fusion energy				
Applied plasma physics				
Operating expenses..........	$ 66,758	$ 73,300	$ 73,300	$ 76,040
Capital equipment...........	6,200	4,000	4,000	5,060
Subtotal....................	72,958	77,300	77,300	81,100
Confinement systems				
Operating expenses..........	123,727	181,000	181,000	186,050
Capital equipment...........	18,210	21,800	21,800	20,650
Construction................	13,446	0	0	0
Subtotal....................	155,383	202,800	202,800	206,700
Development and technology				
Operating expenses..........	69,981	74,300	74,300	77,310
Capital equipment...........	12,700	9,700	9,700	7,740
Construction................	6,000	0	0	0
Subtotal....................	88,681	84,000	84,000	85,050
Planning and projects				
Operating expenses..........	31,015	28,962	28,962	48,700
Capital equipment...........	4,890	4,000	4,000	4,350
Construction................	94,658	46,000	46,000	36,500
Subtotal....................	130,563	78,962	78,962	89,550
Program direction				
Operating expenses..........	3,646	4,000	4,600	4,600
Subtotal....................	3,646	4,000	4,600	4,600
Total				
Operating expenses..........	295,127	361,562	362,162	392,700
Capital equipment...........	42,000	39,500	39,500	37,800
Construction................	114,104	46,000	46,000	36,500
Magnetic fusion energy.....	$451,231	$447,062	$447,662	$467,000
Staffing FTP/Total FTE's.......	64/68	67/71	67/71	67/71

Authorization: Section 209, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
Magnetic Fusion Energy
(dollars in thousands)

FY 1983 Appropriation	$447,062
o Increased personnel costs	+ 600
FY 1984 Base	447,662
Applied Plasma Physics	
o An increase of about 4% is provided in operating expenses to support theory, experimental plasma research, advance fusion concepts and the computer network	+ 2,740
o Capital Equipment support increased	+ 1,060
Confinement Systems - Toroidal Systems	
o An increase is provided for operation of experimental devices, and continued fabrication of improvements to existing devices (no new projects initiated)	+ 6,250
o TFTR funded at FY 1983 funding level	+ 200
o Support for Capital Equipment held slightly below the FY 1983 level	- 50
Confinement Systems - Mirror Systems	
o Operational support of tandem mirror devices is increased	+ 5,323
o Support of EBT operating program decreased as proof-of-principle project is terminated	- 3,950
o Fabrication of TARA project is completed and operations initiated	- 2,773
o Capital Equipment support decreases	- 1,100
Development and Technology	
o An increase in operating expenses of 4% is provided for magnet, heating, material and system component research and development	+ 3,010
o Capital equipment support is decreased	- 1,960
Planning and Projects	
o Increase support provided for Tokamak Flexibility Modification of TFTR	+ 3,200
o Increase provided for fabrication of auxiliary components for MFTF-B is partially offset by a decrease in construction efforts	+ 6,738
o FMIT support continued	- 200
o Capital Equipment funded at essentially the FY 1983 level	+ 350
o GPP supported at FY 1983 level	+ 500
FY 1984 Budget Request	$467,000

	FY 1982	FY 1983	FY 1984 Request
Applied Plasma Physics..........................	$ 72,958	$ 77,300	$ 81,100
Operating expenses............................	66,758	73,300	76,040

The FY 1984 budget request for Applied Plasma Physics is $81,100,000. This includes $76,040,000 for operating and $5,060,000 for capital equipment expenses.

The Applied Plasma Physics subprogram develops applied physics knowledge through theoretical studies and small experiments for advancement of the fusion program. It is also responsible for developing promising fusion ideas for use in tokamaks and mirrors. It supports and supplements research performed on mainline devices to obtain information on new techniques and understanding of new concepts. This work is a key element in the scientific understanding of fusion and is essential to the development of practical, economic fusion energy. This subprogram generates a large percentage of the plasma physicists and engineers employed in all areas of the fusion program through its support of research in universities.

The subprogram's scientific importance increases in FY 1984 as several toroidal confinement experiments terminate or modify their operation. The Texas Experimental Tokamak (TEXT) facility, the small experimental tokamaks and mirrors, the experiments on alternative magnetic configurations, and theoretical analysis will provide much of the new data and understanding required by the fusion program as it concentrates its resources on steady-state toroidal machines and on tandem mirrors.

Recent work has emphasized improved performance of the ZT-40 reversed field pinch experiment and the compact toroid experiments at LANL. Fabrication of the S-1 spheromak at PPPL will be completed in FY 1983. The Texas Experimental Tokamak is in full operation with outside user experiments and a productive research program by the University of Texas. Diagnostic techniques to measure magnetic field profiles have been developed and are now being tested. Improved theoretical understanding of beta limits and transport in tandem mirrors has led to redesign of MFTF-B. Theory has also provided possible explanations of beta saturation in tokamaks and improved designs of a modular torsatron and a Heliac. A second Cray has been added to the Computer Center and all the major facilities of the Computer Network are now connected by satellite communication links.

Advanced Fusion Concepts.......................	$ 17,378	$ 18,616	$ 19,900

The Advanced Fusion Concepts category supports experimental tests of fusion concepts which can test new ideas concerning improvements in the fusion development program. This area of research contributes to the major program objective of exploring physics options that might lead to new ideas and improvements for reactor approaches. Two separate toroidal confinement approaches, the reversed-field-pinch (RFP) and compact toroids, are being tested with experimental programs of modest size.

The FY 1984 funding level will allow for operation of the S-1 spheromak device at PPPL, maintain operation of the Reversed Field Pinch (ZT-40 device) at LANL and operate the compact toroid experiments. Funding of $1,000,000 for a major device fabrication project (ZT-H) to extend the performance of the reversed-field-pinch machine at LANL is provided. Research on proton based alternate fusion fuels will be terminated as this does not appear as promising as originally anticipated. Studies on the small modular stellarator experiment at the University of Wisconsin will continue.

Experimental Plasma Research..................	$ 15,186	$ 16,844	$ 17,080

The Experimental Plasma Research category provides data on plasma properties, atomic physics, heating methods and new diagnostic techniques in support of confinement experiments. The funding request of $17,080,000 will be utilized to continue the majority of existing contractors at a constant level of effort and to initiate the compilation of a fusion experimental data base. The objective of this effort is to initiate a process which will lead to the creation of a national data bank in which validated data from the large experiments will be stored and made available to researchers in the fusion program. The compilation and dissemination of data becomes increasingly important as new large facilities such as TFTR come into operation. In order to accomplish these goals within the requested increment several existing programs will be eliminated or significantly reduced. Programs supported to utilize gyrotrons and improved positive ion sources will be dropped. In addition, programs in support of negative ion source development and superconducting material research, although very successful, will be reduced because of their lower priority.

The funding flexibility provided by these program reductions together with the FY 1984 increase will be used to moderately enhance those projects that provide information on critical issues or which are developing new measurement techniques. Some examples are plasma current density measurements and current drive in toroidal machines with radio-frequency energy. Efforts devoted to mirror diagnostics and mirror physics issues will be maintained at their FY 1983 level. In addition, the effort to utilize the TEXT device for making comprehensive measurements of electron transport in tokamaks will be continued at a constant level of effort.

	FY 1982	FY 1983	FY 1984 Request
Fusion Theory..................................	$ 21,019	$ 22,308	$ 23,300

A funding request of $23,300,000 is provided for this category in FY 1984. Fusion Theory is responsible for developing and applying models of plasma behavior in all fusion devices. This activity provides theoretical and computational modeling for the entire fusion program, including support for tokamaks, mirrors, alternate concepts, and component development. The effort is applied to interpreting and understanding experimental results, designing experiments and conceptual reactors, and improving confinement concepts.

The narrowing of the experimental base of the fusion program will make greater demands on the theory activity to synthesize experimental data and to project reactor implications. Present scientific issues require inventive theory of the sort which has produced current drive in tokamaks and thermal barriers in tandem mirrors. Already the use of high speed computers to apply more accurate models, coupled with improved experimental diagnostics, has produced predictive understanding of many reactor characteristics. But critical phenomena such as pressure limits, confinement, and impurity control are still only partly understood and necessitate intense theoretical effort. Increased funding will support work on steady-state, current driven tokamaks. An increase is requested to study at a modest level improved variants of tandem mirrors. The reactor attractiveness of these would be enhanced by axisymmetry and substitution of rf for neutral beams, but modeling and analysis are required to determine if this is possible and how to optimize the resultant configurations. Continued funding is requested for theory of compact systems. These offer potentially attractive reactor features and aid in understanding tokamak physics.

	FY 1982	FY 1983	FY 1984 Request
National MFE Computer Network..................	$ 13,175	$ 15,532	$ 15,760

A request of $15,760,000 is provided for this category in FY 1984. This activity provides for virtually all the large and medium scale scientific computing used in the magnetic fusion program. The network is composed of the National MFE Computer Center (NMFECC) at LLNL; five User Service Centers (USCs) at PPPL, ORNL, LANL, GA Technologies, Inc., and LLNL, connected to the national center by wide band satellite communications links; fourteen smaller fusion research sites served by medium band links; and over 30 other contractors served by dial-up lines. The large computers at the NMFECC include a CRAY-1S, a CRAY-1 and CDC 7600.

A special effort was started in FY 1982 to expand the use of the network for engineering design and experimental data analysis. This usage now accounts for half of the total. Installation of special computer aided design systems in FY 1983 and 1984 will add to this capacity and ensure economy and reliability of fusion devices. The increased funding will be used for partial support of the following activities: to upgrade one of the Cray computers to a more powerful computer to serve the increased workload, to provide additional consulting, user services and system utilities, improve network communications including high speed graphics, and computer aided design systems.

	FY 1982	FY 1983	FY 1984 Request
Capital Equipment............................	$ 6,200	$ 4,000	$ 5,060

The Experimental Plasma Research area ($1,860,000) will restore funds to the Texas Experimental Tokamak and will provide diagnostic, vacuum and power supply equipment to university and laboratory contractors. Equipment in universities is particularly needed as these contractors are generally suffering a serious and continuing deterioration of their laboratory facilities. The Advanced Fusion Concepts area will provide funds ($1,800,000) for improvements for reversed field pinch experiment, $500,000 to initiate procurement of a motor generator set, costing about $6,000,000, for the ZT-40 device and for final fabrication of the S-1 spheromak. The remaining funds ($1,400,000) are for the Computer Network to provide higher speed communication, to install engineering design equipment at the NMFECC, and to improve the capability of the USC's. This includes $700,000 to purchase a file management system.

Confinement Systems............................	$155,383	$202,800	$206,700
Operating Expenses............................	123,727	181,000	186,050
Toroidal Confinement Systems..................	88,665	137,700	144,150

During FY 1984 the first significant results will begin to appear on the Tokamak Fusion Test Reactor (see the section on TFTR). At the same time the TFTR effort focuses on preparing for the demonstration of scientific feasibility, which is of critical importance to the overall fusion program, the base Toroidal Confinement Systems program will increasingly concentrate on improving the tokamak reactor concept. Chief among the potential improvements is the development of a long pulse or steady-state tokamak using rf or particle current drive. The reduced thermal fatigue, simplified coil structure, and smaller size and cost of this concept coupled with the large base of positive experience with pulsed tokamak operation combine to make the long pulse tokamak the leading candidate for a fusion reactor.

Doublet III (D-III) will be in operation with the addition of a Japanese-funded neutral beam system and with a 1 MW electron cyclotron radio frequency heating capability. Extensive explorations of beta limits and plasma shaping effects will be carried out.

To shift resources into programs addressing steady-state issues, the present Poloidal Divertor Experiment (PDX) will be phased out in FY 1983. The Princeton Large Torus (PLT) and the Alcator C facilities will be utilized in the steady-state experimental program to provide test-beds for long-pulse current drive experiments to take advantage of the recent successful current drive measurements on PLT and Alcator C. In FY 1984, these current drive experiments will be carried to high power levels at reactor-like density levels on Alcator C, which will also concentrate on extending confinement experiments to 1 MA current levels. A more basic program oriented toward the development of new current drive techniques will be pursued on PLT.

ISX will continue and extend the FY 1983 tests of pumped limiters for impurity control and ECRF for disruption control, with an emphasis on electric potential effects, using a new diagnostic being brought on line in late FY 1983.

Major objectives for FY 1984 will be:

(a) Gather size scaling data from TFTR ohmic operation; initial neutral beam operation

(b) Conduct high beta experiments on an elongated plasma in Doublet III using the full complement of three neutral beamlines (nominally 10 MW); a demonstration of tokamak reactor beta level should result from these experiments.

(c) Complete fabrication and initiate high power, high frequency RF current drive experiments on Alcator C; initiate tests of moderate frequency RF current drive combined with auxiliary heating on PLT.

(d) Provide preliminary assessment of electric potential effects in tokamak operation.

In parallel with the major experimental program, efforts will continue on optimizing the toroidal concept, through small scale experiments and through conceptual studies, especially the conceptual design efforts on the Advanced Toroidal Facility at ORNL.

The overall Toroidal Confinement Systems request of $144,150,000 is accounted for by $63,650,000 for Research Operations, $8,200,000 for Major Device Fabrication, and $72,300,000 for TFTR.

	FY 1982	FY 1983	FY 1984 Request
Research Operations............................	$ 49,328	$ 55,550	$ 63,650

At PPPL $18,200,000 is requested. $17,200,000 of this total is requested for the PLT facilities which will be modified to operate as part of the steady-state experimental program. It will have a moderate power, lower hybrid rf current drive system to provide for multi-second operation of the PLT tokamak. In addition, lower power experiments on other possible rf current drive methods will be explored, leading to an evaluation of the optimum approach in FY 1985. Initial tests of heating these current driven tokamaks will also be carried out, both with rf and neutral beams. An additional $400,000 of the total is requested to support advanced toroidal concept studies at PPPL and $600,000 is requested to carry out reactor modeling of such advanced toroidal concepts at PPPL.

At ORNL, $9,000,000 is requested for operation of ISX-B as the only tokamak facility capable of providing information on electric potential effects on beta limits, impurity transport and control, and plasma disruptions. These funds will also support continued effort to optimize the toroidal confinement concept through conceptual design of an Advanced Toroidal Facility to utilize the ISX facility after completion of the ISX-B program. Especially in the latter part of FY 1984, these funds will also support ORNL scientists who will go to Princeton to participate in the TFTR experimental program.

At MIT, $8,000,000 is requested for operation of Alcator C with high power lower hybrid current drive and plasma heating capability; the third and fourth megawatts of rf power will be added early in FY 1984. This program will extend the work begun on PLT and Alcator C to higher power and reactor level plasma density.

At the GA Technologies, Inc., $25,500,000 is requested in FY 1984. Of this total $20,500,000 is required for operation of Doublet III (D-III) and $5,000,000 for support of the new vacuum vessel (DIII-D) fabrication project which is scheduled to be installed in FY 1985. The objective of the experimental program in FY 1984 is to study various cross-sectional plasma shapes at near reactor conditions and select the one with the best confinement and pressure holding characteristics required for a tokamak reactor. The requested funds will provide for full machine operations with three neutral beamlines and 1.0 MW of ECH for one shift per day. The Japanese Atomic Energy Research Institute (JAERI) is providing the incremental funds required to operate Doublet III for an average of one additional shift each day, and the GA Technologies, Inc. and JAERI physics teams share the total machine operating time equally. This support is provided under the auspices of an international agreement signed in 1979 wherein the Japanese

1. Title and location of project: General plant projects — 2. Project No.: 84-ER-133

11. Method of Performance:

Design will be by negotiated architect-engineer contacts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required.

Government is providing approximately $70,000,000 over a five-year period for upgrading the Doublet III facility and for this additional operating time. When the cooperation under the agreement is completed, near the end of FY 1984, Doublet III will be shut down for installation of a new larger vacuum vessel with greatly improved experimental access. (See discussion on Doublet III-Dee (DIII-D) under Major Device Fabrication).

In addition to the advanced toroidal magnetic configuration studies specifically listed at PPPL, a total of $2,700,000 is required for other elements of the advanced toroidal program. These funds would be used to support theoretical and experimental programs aimed at developing optimized toroidal configurations. The following activities are being considered for this program in FY 1984:

(1) Continuation of the ergodic magnetic limiter experiment on TEXT.
(2) Implementation of a full scale mechanical divertor on TEXTOR which is a long pulse tokamak in West Germany, under the auspices of an IEA international agreement.
(3) Hardware for testing improved current drive methods.
(4) Toroidal reactor systems modeling (in addition to the modeling studies specifically listed at PPPL) needed to provide direct feedback to the steady-state tokamak program on the reactor implication of the systems being studied.

	FY 1982	FY 1983	FY 1984 Request
Major Device Fabrication.......................	$ 3,647	$ 10,050	$ 8,200

A total of $8,200,000 is requested for continuing major device fabrication activities. Funding of $2,000,000 is required in FY 1984 to continue fabrication of the 60 GHz electron cyclotron system at GA Technologies, Inc. The first 1 MW increment of this experiment should begin operating in late FY 1983 and will begin the first major test of ECH as a technique for plasma heating, for control of the critical plasma profile parameters, and for ECH current drive in toroidal geometry.

$4,500,000 is requested to continue fabrication of a new D-shaped vacuum vessel for Doublet III. An additional $8,500,000 is anticipated to be added to this effort by the Japanese Government as a part of the international agreement discussed under Research Operations. This project would maximize the usefulness of the Doublet III facility by replacing the present doublet-shaped vessel with a larger dee-shaped vessel which would utilize the full bore of the magnetic field coils. The new vessel would increase the plasma minor radius from a=45 cm to a=75 cm and provide for considerably improved access and flexibility. The Doublet III facility, with the addition of the large dee vacuum vessel, will become the prime facility on which much of the basic tokamak research in the 1986-1990 timeframe will be conducted. In addition, non D-T tokamak reactor engineering concepts will be studied in the new vessel. Because Doublet III will be the only large tokamak in the world (except Joint European Torus (JET) in Europe) which standardly produces dee-shaped plasma, the geometry dependent performance of reactor prototype components will also be studied in detail. Finally, because of the flexibility of the new vessel, full scale demonstrations of advanced toroidal applications such as current drive with large ICRF waveguide antennas could be undertaken to provide engineering tests of steady-state toroidal concepts.

$1,700,000 is required to continue the modification of the PLT facilities for the steady-state tokamak experiments. These funds will be used to complete the fabrication of a 1.5 MW, 2.45 GHz lower hybrid system which will provide a long pulse current drive capability to PLT. Experiments with this system will be an extension of the low density current drive experiments on PLT to densities relevant to normal tokamak operations (in the range of 4 X $10^{13} cm^{-3}$). The results from these experiments and those at higher power and density on Alcator C will lead to an assessment of the feasibility of utilizing lower hybrid rf waves to drive steady-state plasma current in a tokamak reactor.

	FY 1982	FY 1983	FY 1984 Request
Tokamak Fusion Test Reactor......................	$ 35,690	$ 72,100	$ 72,300

FY 1984 represents the first full year of experimental operations for the TFTR. TFTR will be one of the two largest operating tokamaks in the world capable of tritium operation, along with the Joint European Torus (JET) which will come into operation somewhat later. Because of the large size increase from previous experiments it is expected that information on geometric scaling for tokamaks will begin to be obtained on TFTR during ohmic operations in FY 1983. This information is critical for future tokamak development. In addition, high current experiments (1.0 MA) and tests of strong compression will test the facility capabilities which are necessary to ensure the scientific feasibility experiments which will take place in 1986. In early FY 1984 the first two of four neutral beams will have been installed and checked out and will be in operation.

The largest fraction of these funds is required for Facility Operations ($22,300,000) which provides for direct control and operation of most of the electrical and mechanical systems necessary for the tokamak, auxiliary systems, and the building and supporting plant facilities. TFTR Technical Support provides for the on-going engineering effort to repair, modify, or improve device components. In addition, $21,700,000 is required for TFTR Technical Support/NB (a) to fund the critical three source test in the neutral beam test cell and (b) to support activities associated with bringing the four neutral beam systems into operation on TFTR. $9,000,000 is required for Experimental Operations of the tokamak. These funds provide for the core physics staff responsible for planning, executing and analyzing of plasma experiments on TFTR. Another $11,900,000 is requested for TFTR Diagnostics to provide for the development, installation, and operation of instrumentation necessary to determine the plasma characteristics in TFTR. Finally, the remaining $7,400,000 is necessary for the CICADA system on TFTR which provides for overall coordinated computerization of the instrumentation, analysis, and data acquisition on TFTR.

Mirror Confinement Systems.....................	$ 35,062	$ 43,300	$ 41,900

A total of $41,900,000 is requested to support the Mirror Confinement Systems program. This program supports the development of the mainline tandem mirror (TM) concept and the Elmo Bumpy Torus (EBT) alternate concept program. Both of these areas are aimed at producing a steady-state, efficient and highly attractive source of fusion power; tandem mirrors as a mainline approach and EBT as an alternate concept. The EBT-S experiment at ORNL is a steady-state experiment. No obstacles are known that would prevent tandem mirrors from operating steady state. The primary technical difference between these two mirror-based concepts is that the tandem mirror is a linear, open-ended system, whereas the bumpy torus is a closed, or toroidal system, which consists of many small mirror cells, linked together in series.

The physics data base for the tandem mirror program will be provided by two tandem mirror devices, TMX-U at LLNL and TARA at MIT. Smaller devices, the Phaedrus tandem mirror at the University of Wisconsin and the Symmetric Tandem Mirror at TRW, Inc., provide supporting data. Mirror data is also being provided by the EBT program. Of the tandem mirror devices, TMX-U is the major "workhorse" facility of the program, with large heating capability in rf and neutral beams. TARA, now being fabricated, will provide a major test of axisymmetric design, the favored reactor approach for the thermal barrier tandem mirror. Together these two machines (TMX-U and TARA) will provide proof-of-principle demonstrations of the key physics issues for thermal barrier tandem mirrors in the period FY 1982-1985. On completion of construction in 1987, MFTF-B will be the largest tandem mirror scaling experiment in the world, and will achieve essentially reactor-level physics conditions. MFTF-B will demonstrate solutions of key physics and technology issues for the axisymmetric thermal barrier tandem mirror concept with reactor level plasmas in a reactor relevant geometry. This information will allow the tandem mirror mainline to be evaluated against the data base of the other mainline concept, the tokamak.

The EBT-S facility at ORNL is the only operating bumpy torus device in the United States, and provides the experimental physics data in this country for this concept. A second bumpy torus machine is operating in Nagaya, Japan. A base scientific program will be maintained on this promising alternate concept using the EBT-S facility in FY 1984. At the proposed funding level, the attendant programmatic considerations of timeliness and technical priority do not allow us to proceed with the completion of the EBT-P project in FY 1984. Funding priorities and technical developments will determine whether a next step, EBT-P device can be reconsidered in future years.

	FY 1982	FY 1983	FY 1984 Request
Research Operations	$ 31,269	$ 37,300	$ 38,673

An amount of $38,673,000 is requested for Mirror Confinement Systems operating research. Of this amount, $30,173,000 is requested for tandem mirrors and $8,500,000 for the Elmo Bumpy Torus program. The tandem mirror funding will be used to operate TMX-U ($20,000,000), begin operations of TARA ($4,573,000) and to continue research on several smaller devices (Phaedrus, STM, MMX, etc.) ($5,600,000).

In the elmo bumpy torus program, a total of $8,500,000 is requested. This level of funding will allow work on EBT-S to continue ($8,000,000), as well as a small amount of off-site work ($500,000). The major areas to be addressed are confinement scaling studies, alternative heating configurations, and concept improvement tests.

Major Device Fabrication	$ 3,793	$ 6,000	$ 3,227

The TARA device is the only MDF activity supported in the mirror program in FY 1984. The requested budget of $3,227,000 will allow completion of this MDF.

Capital Equipment	$ 18,210	$ 21,800	$ 20,650
Toroidal Systems	$ 13,000	$ 15,600	15,550

In FY 1984, a total of $15,550,000 is requested for capital equipment needs. Of this amount $9,650,000 is required for TFTR and $5,900,000 for procurement of diagnostics and other improvements to existing tokamaks.

Within the $9,650,000 for the TFTR program at PPPL $2,000,000 is needed for additional diagnostics, $2,050,000 is needed for miscellaneous test equipment and supplies in support of experimental operations including procurement of a tritium pellet injector, $3,600,000 is needed in support of the computer systems (CICADA) which includes $1,800,000 directly for data processing equipment, $450,000 is needed for power supplies and test equipment for the neutral beams on TFTR, and finally $1,550,000 is required in support of general facilities operation of TFTR. Also at PPPL, within the base tokamak program, a total of $1,000,000 is required for new diagnostics, power supplies, and rf hardware in support of the steady-state experiment modifications to the PLT facility.

At MIT, $1,000,000 is required for diagnostics, power supplies and rf hardware in support of the operation of the Alcator C facility.

At ORNL $400,000 is required for diagnostics and power supplies in support of the operation of the ISX-B facility. In addition, $500,000 is required to procure an ISX Data Acquisition System.

At GA Technologies, Inc. $3,000,000 is required to support high power neutral beam and ECH operations on Doublet III and to support the installation of the new vacuum vessel in FY 1985, and to provide more advanced diagnostic and data acquisition equipment for use with the new vacuum vessel. Within this amount, $1,500,000 will be used for a KL-10 computer system replacement to support the Doublet-III.

	FY 1982	FY 1983	FY 1984 Request
Mirror Systems................................	$ 5,210	$ 6,200	$ 5,100

A total amount of $5,100,000 is requested for the Mirror Confinement Systems program. Of this amount, $4,800,000 is requested for the tandem mirror program and $300,000 for the Bumpy Torus program. In the tandem mirror area, $2,650,000 is requested to support the TMX-U research program; $1,200,000 will be used to complete the TARA MDF and to support TARA operations; $450,000 for a KL-10 computer system replacement to support the MFTF-B; and the remaining $500,000 will be used to support Phaedrus, STM and the MMX research programs. The $300,000 requested for the EBT program will be used in support of EBT-S.

Development and Technology........................	$ 88,681	$ 84,000	$ 85,050

The goals of the Development and Technology subprogram are (1) to provide technology support to the major existing confinement experiments (TFTR and MFTF-B); (2) to develop the critical engineering and technological basis needed for selection of the most attractive confinement and technology options for the Engineering Test Reactor (ETR), and for the design and construction of that device; and (3) to support key long term engineering requirements for developing commercial fusion. An objective in achieving these goals is significant participation by commercial industry in fusion technology to build the industrial base which will be needed to carry through the technological development of fusion. A major effect of the new strategy in magnetic fusion energy is that D&T efforts will emphasize high priority work that supports reactor concept selection (e.g., reactor studies) and technology feasibility questions (e.g., development of high heat flux components). Second priority will be accorded work that involves technology optimization (e.g., superconducting magnets) and long-term development (e.g., tritium waste disposal). The Development and Technology subprogram is organized into seven categories whose budget details are discussed below.

Operating Expenses..............................	$ 69,981	$ 74,300	$ 77,310
Magnetic Systems................................	14,915	16,455	16,800

Superconducting magnet systems are required to produce the magnetic fields that will contain and control the plasma in a fusion reactor in the necessary efficient and reliable manner. The objective of the magnetic system program is to develop and demonstrate the technology that will enable timely construction of reliable, cost effective superconducting magnets. The FY 1984 budget request for Magnetic Systems is $16,800,000. This reflects moving into a phase where the major test facilities are completed and a substantial portion of the funding is now shifted into operating the facilities and testing significant superconducting hardware. The major activity will be the International Energy Agency agreement to operate the Large Coil Test Facility at ORNL to test the three international large superconducting coils (Japan, Euratom, and Switzerland) with three U.S. coils in a six coil torus geometry that replicates the tokamak configuration. Increased emphasis will be placed on meeting the critical technology issue of developing a 15 to 20 Tesla superconducting barrier coil for the Tandem Mirror concept. Additional assessments have resulted in deferral of substantially all pulsed magnet work while awaiting results of using RF to make tokamaks steady state devices.

Plasma Engineering............................	$ 15,335	$ 18,620	$ 17,525

The objective of the Plasma Engineering program is to develop and demonstrate the components and systems necessary for plasma heating, fueling, and impurity control in fusion reactors.

The plasma engineering operating budget request for FY 1984 is $17,525,000. The funds will be used to conduct design and hardware development of plasma heating, fueling, impurity control, and vacuum components to support operation of current and future experiments. The plasma heating program will maintain efforts on long pulse (30 second) beam development necessary for MFTF-B and TFTR upgrades, high frequency gyrotron development, negative ion beam development and high power ICRF plasma heating. The trends of shifting resources from positive ion neutral beams development into negative ion neutral beams and higher power ICRF plasma heating technology will continue with the provision that the positive ion development activity will not be reduced below that required to support MFTF-B and TFTR.

The advanced neutral beam source for MFTF-B will be tested in improved reliability and higher atomic yield configurations. The advanced neutral beam source for TFTR operation at greater than 1/2 second beam injection will be run at 30 second pulse length. The improved reliability and higher atomic yield features of the MFTF-B sources will be incorporated into the TFTR sources.

The radio frequency technology program to develop technology for ion cyclotron and lower hybrid heating and current drive will operate candidate antenna structures and subcomponents and will test a complete candidate antenna for TFTR upgrades in PLT or Doublet III. Several loop type and wave guide antenna systems will be analyzed and the most promising candidate antennas will be tested to evaluate and optimize performance, reliability and maintainability while minimizing the plasma first wall and blanket areas required.

Upgrading or development of industrial capability to produce rugged, highly reliable and efficient radio frequency components in the 2 to 5 megawatt range, continuous duty will be carried forward. Initial programs will develop components required for upgrades of TFTR and MFTF-B and proceed in future years to support follow-on fusion devices. The fueling programs will concentrate on developing pellets with velocity in the range 2-10 km/s and tritium pellet injection. Impurity control will address tokamak and tandem mirror related technological problems specifically associated with tritium recovery, direct energy conversion, and removal of particles and heat without introducing impurities. Vacuum technology will be devoted to developing means to continuously remove gas rapidly from portions of cryopumping system so that the device can perform in steady state system.

	FY 1982	FY 1983	FY 1984 Request
Fusion Reactor Materials.......................	$ 15,059	$ 16,750	$ 18,985

The objective of the Fusion Reactor Materials program is to identify and develop materials including structural and nonstructural metals, ceramics, polymers and tritium breeding materials which are required to build and support experimental plasma test facilities and fusion power reactors. The activities focus on both short and long term needs; short term activities in support of the goal to demonstrate the scientific feasibility of fusion, focus on developing the technologies associated with the interaction of the plasma with all exposed material surfaces and high heat flux components such as limiters. Mid-term technologies focus on research complementary to experimental plasma test facilities directed toward advancing the knowledge of the plasma boundary region and on technologies to provide the information data base which will allow concept selection for the ETR. These include research on superconducting and normal magnet materials. Long term technology activities in support of an industrial decision in the year 2000 focus on solving the materials problems associated with extended exposure to an environment which includes high energy (14 MeV) neutrons, charged particles and high temperatures. Major aspects of long term activities are (1) to evaluate the damage phenomena which occur in the fusion environment and (2) to develop radiation resistant and low activation materials and structural alloys which will withstand the harsh fusion environment. Materials that are being studied and developed include alloys with which to build the reactor structure, ceramics to protect the alloys from high energy plasmas, inorganic components to breed tritium fuel and to convert neutron energy into heat, and coolants to extract the heat for conversion to electrical energy.

The FY 1984 request is $18,985,000 for this category. New tasks which are to be accomplished with this increased funding include: (1) development of high heat flux components such as limiters and beam dumps in support of existing and planned plasma physics facilities; and (2) a program to address the potential impact of utilizing low activation materials in fusion reactors. An additional $1,450,000 will be utilized to fund increased operating and fuel costs at the Oak Ridge Reactor (ORR).

	FY 1982	FY 1983	FY 1984 Request
Fusion Systems Engineering.....................	$ 10,950	$ 12,610	$ 11,860

The objective of this category is to address the fusion reactor engineering issues which are associated with reactor concept selection and are critical to practical fusion energy development. Specifically, the development of tritium handling, blanket and shield, and other fusion reactor systems is a major responsibility. In addition, an essential function for guiding physics and engineering development toward practical reactor concepts is provided through reactor system study activities in fusion reactor conceptual design, reactor subsystem design, economic analysis and plasma systems analysis.

The FY 1984 request will provide continuation of tritium activities at the FY 1983 level of effort, while permitting a modest increase in blanket and shield engineering to support data base development needed to address critical issues in blanket breeding and power conversion. The reactor studies element will focus on conceptual design of fusion power reactors as input to the reactor concept selection and on engineering studies of critical issues. Included are studies of high power density reactor options and a comparison of alternative blanket concepts. Close coordination between the ETR design efforts and this element will be maintained to assure information flow relative to the ETR concept selection. The blanket and shield element will continue to develop performance data on candidate first wall and blanket components under a range of conditions typical of fusion reactors for thermomechanical, thermal hydraulic, and electromagnetic effects. Tritium breeding and extraction experiments will continue in fission reactors to answer critical feasibility questions on solid breeding materials. Blanket maintenance issues will be addressed by specific tests on hardware concepts for remotely maintainable mechanical joints and electrical connectors. The tritium processing and control program element is funded to provide for nominal operation of the Tritium Systems Test Assembly (TSTA) and the continuation at TSTA of an experimental studies program in tritium cleanup and control technology. In addition the design of an upgrade at TSTA will be initiated in order to develop the capability to process tritium oxide wastes from the Tokamak Fusion Test Reactor (TFTR). Base technology programs in tritium will continue at a reduced level of effort.

Environment and Safety..........................	$ 2,725	$ 2,840	$ 3,000

The objective of the Environment and Safety category is to assure that the development and ultimate operation of fusion power reactors are accomplished with minimum adverse effects in the environment and with maximum safety for both the public and operating personnel. The level of funding will provide continuing studies and experimental efforts in several safety research areas such as tritium permeation, magnets, activation products and lithium as well as continuing development of analytical methods and models. The final Generic Environmental Impact Statement (GEIS) for the Magnetic Fusion Energy Program will be issued.

	FY 1982	FY 1983	FY 1984 Request
Fusion Energy Applications	$ 1,847	$ 1,550	$ 1,000

The goal of this category is to identify and demonstrate the technical, economic, and environmental feasibility of fusion process applications other than conventional production of electric power including chemical fuel production and fission-fusion energy systems.

In FY 1984 much of the effort previously identified in this category will be more closely integrated into other appropriate parts of the Development and Technology subprogram. For example, many of the blanket tasks previously identified as part of this effort will now be carried out in the Blanket and Shield program. The fusion-fission hybrid program will continue to evaluate go/no-go questions related to this technology. The synthetic fuel program will study improvements to present thermochemical cycles and explore alternate cycles such as ethanol production.

Engineering Reactor Design and Development	$ 9,150	$ 5,475	$ 8,140

This activity provides the preliminary analysis and initial design activities needed to help the fusion program decide on the experimental steps that must be undertaken to achieve engineering feasibility in the 1990's. A range of potential projects, from near-term experiments needed to demonstrate the readiness of the program to proceed with an engineering test reactor (ETR) through to the ETR itself, are included in this category.

The Office of Fusion Energy has tasked the Fusion Engineering Design Center (FEDC) to accomplish this analysis and design. The Center, in conjunction with key individuals and groups in industry and other fusion laboratories, will undertake studies beginning in FY 1984 with two objectives:

1. To estimate cost, performance and uncertainties of various strategies to achieve engineering feasibility. Primary emphasis will be on reference designs of the most advanced mirror and tokamak ETR systems, based on physics and technology projections.
2. To compare the attractiveness of tokamak and mirror confinement concepts by analysis of these reactor designs.

This activity will be closely coordinated with reactor study activities carried out independently by laboratory/university/industry groups that are focused on fusion reactor concepts beyond ETR to provide long-term perspective to concept selection.

This funding category was established in FY 1983. Previous efforts in this general area had been directed toward development of a Fusion Engineering Device (FED) under the Center for Magnetic Fusion Energy subprogram. In FY 1983, design studies have begun for possible mirror and tokamak upgrades of MFTF-B and TFTR as near-term experiments.

Capital Equipment	$ 12,700	$ 9,700	$ 7,740

The FY 1984 requirements for capital equipment in Development and Technology total $7,740,000. These requirements are highlighted by program element categories below.

Magnetic Systems	$ 5,120	$ 3,500	$ 2,600

Capital equipment funds of $2,600,000 in the magnetic systems program area is primarily to provide an inventory of critical items in the Large Coil Test Facility to prevent any extended delays in operation of the facility and to increase the coil analysis capability as the six large coils are tested 40 percent beyond nominal design to determine their ultimate operating conditions.

	FY 1982	FY 1983	FY 1984 Request
Plasma Engineering..........................	$ 4,390	$ 4,200	$ 2,775

Capital equipment funds of $2,775,000 in the plasma engineering program will be used for equipment purchases to support neutral beam and radio frequency technology test facilities. Most of these funds will be used to purchase smaller pieces of equipment in support of these activities with the exception that a high power RF power unit will be purchased for RF technology and development testing.

Fusion Reactor Materials....................	$ 1,840	$ 1,600	$ 1,415

The FY 1984 capital equipment budget request is $1,415,000. FY 1984 capital equipment requirements are focused on the characterizations of the plasma interaction with the first wall and with high heat load component materials on irradiation testing facilities and irradiated specimen testing.

Fusion Systems Engineering..................	$ 1,210	$ 380	$ 650

Capital equipment funds of $650,000 are required to procure spare parts for TSTA, power source components for a surface heat flux facility (ASURF), instrumentation for fusion electromagnetic instrumented experiment (FELIX) and miscellaneous equipment to support tritium breeding and extracting experiments, and integral neutronics experiments.

Environment and Safety......................	$ 100	$ 20	$ 300

Capital equipment requirements for FY 1984 total $300,000 for experimental hardware to support experiments in the areas of tritium permeation, magnet safety, lithium materials, and activation product control.

Planning and Projects..........................	$130,563	$ 78,962	$ 89,550
Operating Expenses...........................	31,015	28,962	48,700

The goal of the Planning and Projects subprogram is to provide for the major construction projects in the magnetic fusion program, and also to provide for the development programs required in direct support of these construction projects. Projects currently under way will advance the fusion program by providing major plasma scaling information when the projects begin operation and by providing technology development information during the construction and testing period as well as during operation.

This subprogram currently, in FY 1983, includes the construction program of the Mirror Fusion Test Facility-B (MFTF-B) at LLNL, the development and fabrication tasks associated with TFTR flexibility modifications at PPPL, and critical development tasks for the Fusion Materials Irradiation Test Facility (FMIT) at HEDL.

MFTF-B is a thermal barrier tandem mirror device which will be the largest experimental facility in the world capable of investigating the mirror fusion concept. MFTF-B will be capable of investigating mirror plasma parameters 100 times beyond those of current tandem mirror experiments. The program objectives of MFTF-B are (1) to investigate plasma confinement conditions under reactor related conditions; (2) to explore plasma confinement scaling in a tandem mirror configuration; and (3) to provide significant technological advances in the areas of high energy and quasi-steady-state heating systems, large vacuum vessel pumping systems, large superconducting magnets, computer control, and operation of large plasma facilities. The MFTF-B will incorporate an axicell magnet configuration that enhances physics performance, increases experimental flexibility and enables operation in a manner consistent with current plans for commercial tandem mirror reactors. The MFTF-B facility is scheduled to be completed in early calendar year 1987 and to initiate experimental operation later in 1987. It is anticipated that in late 1988, sufficient experimental performance data will be available from operating MFTF-B and TFTR to enable a comparative evaluation between the tandem mirror and tokamak fusion confinement concepts.

The TFTR flexibility modifications consist of various tasks which provide enhancements to and are integrated with the objectives of the base facility and which will result in hardware modifications and additions to TFTR. These modifications will provide a significant enhancement of plasma performance parameters and enable TFTR to enter the alpha heated modes of operation in which alpha particles produced in the deuterium-tritium reaction continue to heat the plasma. Relative to base TFTR operation, the neutral beam power level will be increased by 33% and the capability to confine a 75% higher plasma pressure will be provided. The pulse length capability of several key systems will also be increased to 1.5 seconds.

The FMIT will provide the capability to determine the effects of the fusion reactor neutron environment on candidate reactor materials and will provide the basis for materials selection for mid-term and long-term facilities of the fusion program. The goal of the FMIT project is to design, construct, equip and put into operation a facility for conducting neutron irradiation testing in an environment comparable to that in a fusion reactor. The major objectives are to determine the effects of high energy neutrons on mechanical properties of materials, the bulk irradiation effects, and surface effects and to utilize this experience to link high fluence damage from fission reactors with calculated damage at the same neutron fluence, but with a fusion energy spectrum.

A construction project data sheet is included to provide details for the MFTF-B project. The following describes the requirements for operating funds.

	FY 1982	FY 1983	FY 1984 Request
Tokamak Fusion Test Reactor....................	$ 16,980	$ 17,500	$ 20,700

Funding of $20,700,000 is requested for FY 1984 for continuing TFTR flexibility modifications which will primarily enable the TFTR to operate in a physics regime in which self heating of the plasma occurs as a result of the burning of the fusion D-T fuel. This funding provides for the following tasks: fabrication of vessel armor plating to withstand higher heat loads, fabrication of vessel surface pumping hardware, and design, fabrication and installation of radiation shielding and fire seals. These tasks are integrated with the base facility and provide margin for the achievement of the basic TFTR objectives as well as alpha heating. Also, funding to support preliminary analysis, conceptual designs and development related to potential additional enhancements which would maximize the use of the TFTR facility will be requested under Engineering Reactor Design and Development.

	FY 1982	FY 1983	FY 1984 Request
Mirror Fusion Test Facility-B..................	$ 9,035	$ 8,262	$ 25,000

The requested FY 1984 funding level of $25,000,000 will provide for (a) development associated with key MFTF-B systems, (b) auxiliary component fabrication, and (c) facility preparation.

The requested funding for MFTF-B development activities is $2,000,000. The FY 1984 funding is required to continue the development related to MFTF-B experimental systems.

The requested funding for MFTF-B auxiliary component fabrication is $20,404,000. These auxiliary components are planned to be installed on MFTF-B facility at the initiation of experimental operations and, in total, they are estimated to cost approximately $100,000,000. They will be fabricated primarily during FY 1984, FY 1985, and FY 1986 and be installed primarily during FY 1986.

FY 1984 requested funding for facility preparation is $2,596,000. This funding is required for planning the operation of MFTF-B systems and components as an integral facility.

	FY 1982	FY 1983	FY 1984 Request
Fusion Materials Irradiation Test Facility.....	$ 5,000	$ 3,200	$ 3,000

The requested funding level is $3,000,000. This funding level provides the necessary development support for FMIT. The FMIT facility will provide the neutron energy spectrum representative of a fusion reactor environment. However, neutron fluxes several times that of a fusion reactor will be provided to allow accelerated end-of-life testing of fusion materials. If international cooperation funds are available during FY 1984, then the accelerator development will be completed, as will the remote handling and experimental servicing equipment. Systems integration, control hardware, and software will be developed. Preparations for accelerator start up will begin; operator training and familiarization will be carried out on the accelerator facility constructed at Los Alamos National Laboratory. Development of diagnostic and auxiliary equipment will continue. In the absence of these international funds the project activity will be significantly reduced to allow only the completion of accelerator development, remote handling and experimental servicing equipment.

Capital Equipment............................	$ 4,890	$ 4,000	$ 4,350

The FY 1984 budget request for capital equipment in Planning and Projects is $4,350,000. This funding request permits the purchase of electrical signal processing equipment associated with diagnostic instrumentation for TFTR flexibility modifications ($350,000). In addition, $4,000,000 is requested for General Purpose Equipment at ORNL, which includes $1,500,000 for the PDP-10 system upgrade and $695,000 for the CAD System associated with the Computer Science Division.

Construction

Mirror Fusion Test Facility - B................	$ 39,858	$ 40,000	$ 30,000

The MFTF project, which was originally authorized as a single mirror device in FY 1978, was reauthorized as a tandem mirror device in FY 1981 as the MFTF-B project. The project is the major scaling experiment for the tandem mirror concept. MFTF-B will produce the data base necessary for the next program step leading to an experimental power reactor. The test facility apparatus will consist of superconducting magnet systems, vacuum system, liquid helium cryoplant, power distribution system, support structure, diagnostics and machine controls. This will provide the capability to produce a tandem mirror magnetic field, a vacuum and high voltage power for use in performance of tandem mirror confined fusion experiments. The FY 1984 funding will allow the continuation of design and fabrication of MFTF-B systems including superconducting magnets, vacuum vessel, and pumping systems, cryogenic system and power supplies, and computer controls.

Fusion Materials Irradiation Test Facility.....	$ 9,000	$ 0	$ 0

Construction of FMIT has been deferred for the past two years because of funding constraints. In FY 1983, activity will primarily be limited to assembling and testing the first 2MeV section of the 35MeV linear accelerator at Los Alamos National Laboratory.

The goal of the FMIT is to provide the irradiation testing capability for the development and qualification of fusion reactor materials and the generation of engineering data to guide alloy development and reactor design activities. While no construction funds are requested in FY 1984, the program is attempting to obtain international funding support for the project in FY 1984 and beyond.

	FY 1982	FY 1983	FY 1984 Request
General Plant Projects..........................	$ 5,700	$ 6,000	$ 6,500

The FY 1984 budget request for General Plant Projects is $6,500,000. These funds will be used to support projects at several laboratories to meet health, safety and programmatic requirements and to provide for miscellaneous modifications, additions, alterations, replacements and non-major new construction items to meet programmatic goals. This will allow us to provide continuity of operation, improvement to economy, minor changes in operating methods and protection of the Government's investment by preventing excessive deterioration of facilities. Of the total funding requested, $4,200,000 is provided to ORNL; $1,000,000 to LLNL; $1,000,000 to PPPL, and $300,000 to LANL. These requests cover all of the laboratory's program areas, as well as MFE requirements. The general plant projects will allow the Department to make maximum efficient utilization of the Government's investment in facilities.

	FY 1982	FY 1983	FY 1984 Request
Program Direction			
Operating Expenses..............................	$ 3,646	$ 4,000	$ 4,600
FTP/Total FTE's..................................	64/68	67/71	67/71

The FY 1984 budget request for Magnetic Fusion Energy Program Direction is $4,600,000. These funds are required to provide for the salaries, benefits, travel, and other expenses associated with the 71 full-time equivalents (67 full-time permanent, 4 other than full-time permanent) required to administer the program. The increased funding is to provide for increased personnel costs such as within-grade and merit increases and benefits. The increased funding further reflects the impact on average salaries of the FY 1982 and FY 1983 pay cap increases and two general pay increases in FY 1982 and FY 1983.

This manpower base provides the technical and management expertise needed to direct and administer a scientific and highly technical research and development program with an annual budget of about a half billion dollars. Staff activities include policy and program planning and development; the design of alternate development plans; assessment of scientific needs and priorities; monitoring and evaluation of laboratory programs; monitoring of university and private and industrial contracts, laboratory programs, and large construction projects; participation in research and advisory committee meetings and workshops; interagency and international liaison; as well as related administrative and program support activities.

Although staffing levels have remained stable for the past several years, program efforts have continued to expand. Increased staff productivity is required to provide the increased management effort associated with the program's revised strategy and redirection to achieve the fullest utilization of existing major facilities and subsequent upgrades of these facilities to address major technical and engineering issues. This involves changing the current emphasis on managing and evaluating facilities to one of task orientation, i.e., defining specific tasks for facilities as well as reviewing and evaluating performance in accomplishing these tasks to achieve more effective utilization. This level continues the staff support required to maintain the program which is entering a new phase, having increasing dependency on international collaboration and reflecting the shift from construction of large facilities to the conduct of technical research and development experiments.

DEPARTMENT OF ENERGY
Energy Supply Research and Development
Magnetic Fusion
(dollars in thousands)

Project Number	TEC/ TPC	Project Title and Location	Phase	Funds Appropriated To Date	Total Obligations		Total Cost		Remarks
					Planned***	Actual	Planned	Actual	
78-3-a	$243,200*	Mirror Fusion Test Facility-B Livermore, California	Construction	$187,058*	$ 96,143*	$147,057*	$114,812*	$128,388*	
	$166,400			44,957**	127,443***	38,957**	127,469**	38,931**	

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*P&CE (excludes $400,000 for PE&D)
**Operating Expenses
***FY 1983 through completion of project

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

PLT RF Modifications Princeton Plasma Physics Laboratory Princeton, New Jersey	Total Estimated Cost (TEC): $4,600,000 (For Design and Construction)

PLT RF Modifications
Princeton Plasma Physics Laboratory
Princeton, New Jersey

Total Estimated Cost (TEC): $4,600,000

(Tabular dollars in thousands, Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1982 Actual			FY 1983 Estimate		FY 1984 Estimate		FY 1985 Estimate		Total Project Funding
		B/A	Obs.	B/O	B/A	B/O	B/A	B/O	B/A	B/O	
Fabrication:											
Operating Expenses.........	$ 0	$300	$300	$192	$2,600	$2,600	$1,700	$1,700	$ 0	$108	$ 4,600

Description, Objective and Justification

Modification will be made to the PLT facility to conduct experiments on the physics of steady-state current drive. Both the lower hybrid and the ICRF methods will be utilized to provide the steady-state current drive in the tokamak configuration, supplementing the inductive ohmic system which is good only for pulsed tokamak operations.

The feasibility of using lower hybrid rf sources to drive steady-state current in tokamaks has already been demonstrated on PLT and Alcator. A plasma current of about 165 kA was sustained for 3.5 seconds in PLT with 90 kW of 800 MHz lower hybrid rf power. The maximum line average value of electron density was $7 \times 10^{12} cm^{-3}$ in these plasma with a toroidal field of 30 kG. In Alcator, the high toroidal field (80kG) and higher frequency (4.6 GHZ) have made it possible to drive current with rf at higher densities. The next priority in this program is to demonstrate that current drive can be accomplished in plasmas with densities in the $4 \times 10^{13} cm^{-3}$ range permitting high power bulk heating with the existing ICRF and neutral beam units on PLT's. This step requires a higher frequency (2.45 GHZ) and higher power (1.5MW) rf system, which will permit an examination of lower hybrid current drive efficiency as a function of temperature.

The bulk of the funding requested for this project will be needed to acquire and install the 2.45 MHz lower hybrid rf system and for the development of rf launching grids.

The modifications required to the PLT tokamak to operate it in near steady-state conditions are under investigation.

PLT RF Modifications
Princeton Plasma Physics Laboratory
Princeton, New Jersey

Total Estimated Cost (TEC): $4,600,000

(Tabular dollars in thousands, Narrative material in whole dollars.)

Schedule of Planned Activities

	Start	Complete
Design	June 1982	March 1983
Long Term Procurements	Nov. 1982	Jan. 1984
Testing of components (power supply, coupler, transmission system)	May 1983	Jan. 1984
Operate	Apr. 1984	

Management and Contracting

Management plan will be developed using Princeton Fusion Program Office.

Prior Year Achievements

Complete and operate first 0.5 MW unit.

Current Year Expectations

Complete and operate 1.5 MW phase.

Reasons for Increases or Decreases

Not applicable.

Cost Estimate

Engineering and Design	$ 605
Fabrication (Labor, Materials and Supplies)	3,112
Administrative Costs	270
	3,987
Contingency	613
	$ 4,600

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

UPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

TARA Tandem Mirror Experiment
MIT Plasma Fusion Center
Cambridge, Massachusetts

Total Estimated Cost (TEC) $14,900,000

TARA Tandem Mirror Experiment
MIT Plasma Fusion Center
Cambridge, Massachusetts

Total Estimated cost (TEC) $14,900,000

Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Year	FY 1982 Actual			FY 1983 Estimate		FY 1984 Estimate		Total Project Funding
	Obs.	BA	Obs.	BO	BA	BO	BA	BO	BA
Operating expenses (DOE):									
Design and Fabrication	$ 503	$ 2,880	$ 2,880	$ 2,830	$ 6,000	$ 6,050	$ 3,226	$ 3,226	$ 12,609
Capital Equipment	0	745	745	220	940	1,465	606	606	2,291
Total Project funding	$ 503	$ 3,625	$ 3,625	$ 3,050	$ 6,940	$ 7,515	$ 3,832	$ 3,832	$ 14,900

Description, Objective and Justification

The purpose of the project is to provide a suitable facility in which the following major tandem mirror objectives can be pursued.

1. To study center cell radial confinement in an axisymmetric tandem mirror configuration;
2. To investigate MHD stability and Beta-limits in axisymmetric tandem mirrors; and
3. To test RF based startup procedures.

Schedule of Planned Activities	Start	Complete
Design	1st Qtr. FY 1982	4th Qtr. FY 1983
Procurement	3rd Qtr. FY 1982	3rd Qtr. FY 1984
Building Site Preparation	4th Qtr. FY 1982	3rd Qtr. FY 1983
Construction	4th Qtr. FY 1982	1st Qtr. FY 1984
Start-up/Operation	4th Qtr. FY 1984	

TARA Tandem Mirror Experiment
MIT Plasma Fusion Center
Cambridge, Massachusetts

Total Estimated cost (TEC) $14,900,000

Tabular dollars in thousands. Narrative material in whole dollars.)

Management and Contracting

This project will be managed by tne MIT Plasma Fusion Center in accordance with the Project Plan.

Prior Year Achievements

Began site preparation and initiated construction of all key components.

Current Year Achievements

In FY 1984, neutral beams, diagnostics and beam lines will be fabricated, thus completing fabrication. The device will be assembled and experimentation will begin.

Reasons for Increases and Decreases

There were changes in the previously projected FY 1982 and FY 1983 budgets because of a delay in the start of the MDF.

Cost Estimate

	($ in K)
a. Design and Procurement	$ 6,498
b. Building site Preparation	2,678
c. Construction	4,080
Subtotal	13,256
d. Contingency	1,644
Total	$ 14,900*

*The total includes $2.280 million which has been escalated at 18 percent per year for the Nabisco site. The remaining funds are based on a 10 percent per year escalation.

Department of Energy
FY 1984 CONGRESSIONAL REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Doublet III New Vacuum Vessel
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $13,000,000
(For Design and Construction)

Doublet III New Vacuum Vessel
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $13,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1982 Actual			FY 1983 Estimate		FY 1984 Estimate		FY 1985 Estimate		Total Project Funding
	Obs.	BA	Obs.	BO	BA	BO	BA	BO	BA	BO	BA
Fabrication:											
Operating Expenses	$ 230	$ 500	$ 500	$ 500	$ 4,600	$ 4,100	$ 4,500	$ 4,500	$ 3,170	$ 3,670	$13,000

Description, Objective and Justification

The Doublet III facility with an integrated capital investment of over $100,000,000 is one of the world's most advanced fusion facilities. The basic capabilities of the facility include: a 550 MVA pulsed power capability, 14.0 MW of neutral beam heating, 2.0 MW of ECH heating and a 2.6T toroidal coil set with a field volume approaching that of TFTR. This project would maximize the usefulness of the Doublet III facility by replacing the present doublet-shaped vessel with a larger dee-shaped vessel which would utilize the full bore of the magnetic field coils. The new vessel would increase the plasma minor radius from a = 45 cm to a = 75 cm and provide for considerably improved access and flexibility. The Doublet III facility, with the addition of the large Dee vacuum vessel, will become the prime facility on which much of the basic tokamak research in the 86-90 time frame will be conducted. In addition, because of the flexibility of the new vessel, advanced toroidal applications like current drive with large ICRF waveguide antennas could be easily undertaken. The equipment will be built by GA Technologies, Inc. and be physically located on GA Technologies, Inc. property.

During FY 1982 a conceptual design was done. The funds expended in FY 1983 provide a detailed preliminary design and some long-lead procurement. During FY 1984 funds will be expended for hardware procurement and fabrication. Preparation for installation of the new vacuum vessel will be completed. The project is planned to proceed in stages with the first stage being the installation of the new vessel itself; this stage is expected to cost less than $13,000,000. Further possible stages would consist of improvements to enhance performance such as the installation of new limiters and vacuum vessel armor and the installation of additional poloidal power supplies to increase the plasma current capability; these improvements would add a total of approximately $9,000,000 to the project cost. The project is expected to be undertaken jointly with the Japan Atomic Energy Research Institute (JAERI) on a cost-sharing basis. Assuming the enhanced performance stages are implemented, the U.S. contribution would be about $5,000,000 to $6,000,000 per year over a three year period. Definitive administrative arrangements with the Japanese are expected to be completed by March 1983.

Doublet III New Vacuum Vessel
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $13,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Schedule of Planned Activities

	Start	Complete
Preconceptual Design	4th Quarter 1979	2nd Quarter 1982
Preliminary Design	3rd Quarter 1982	1st Quarter 1983
Detailed Design and Long Lead Procurement	1st Quarter 1983	2nd Quarter 1983
Construction	2nd Quarter 1983	3rd Quarter 1984
Installation	4th Quarter 1984	4th Quarter 1985
Startup/Operation	4th Quarter 1985	-

Management and Contracting

This project will be managed by GA Technologies, Inc., San Diego, California, under separate contract.

Prior Year Achievements

Completed detailed design.

Current Year Expectations

Complete hardware fabrication and preparations for installation.

Reasons for Increases or Decreases

Not applicable.

Cost Estimate

Presently only a conceptual design has been completed and no firm cost estimate is available. It is anticipated that the new vacuum vessel will be undertaken on a cost-sharing basis as a cooperative activity between the U.S. and Japan.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET SUBMISSION

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Magnetic Fusion Energy

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-109

3. Date A-E work initiated: 1st Qtr. FY 1984

5. Previous cost estimate: None
Date:

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 1st Qtr. FY 1985

6. Current cost estimate: $6,500
Date: December 1982

7. Financial Schedule:

		Costs			
Fiscal Year	Obligations	FY 1982	FY 1983	FY 1984	After 1984
Prior Year Projects	xxx	$ 4,546	$ 1,190	$ 1,654	$ 135
1982	$5,700	910	1,710	850	2,230
1983	6,000	0	1,800	971	3,229
1984	6,500	0	0	1,700	4,800
		$ 5,456	$ 4,700	$ 5,175	$10,394

8. Brief Physical Description of Project:

These projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major new construction items required annually to provide continuity of operation, improvement in economy, road and street improvements, elimination of health and safety hazards, minor changes in operating methods, and protection of the Government's consideration at the present time. The continuing review of our requirements will result in some of the projects being changed in scope; it will also result in other projects being added to the list with the necessary postponements of some now listed, all depending on conditions or situations not apparent at this time.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-109

8. **Brief Physical Description of Project**

The currently estimated distribution of FY 1984 funds by office is as follows:

1. Los Alamos National Laboratory	$ 300
2. Lawrence Livermore National Laboratory	1,000
3. Princeton Plasma Physics Laboratory	1,000
4. Oak Ridge National Laboratory	4,200
	$6,500

9. **Purpose, Justification of Need for, and Scope of Project**

The following are tentative examples of the major items of work to be performed at the various locations:

Los Alamos National Laboratory .... $ 300

Requirements include laboratory and office modifications, and additions and upgrading of building service systems as required to meet programmatic goals of the Magnetic Fusion Energy program.

Lawrence Livermore National Laboratory $1,000

Enlarge Storage/Receiving Area and Accommodate Crafts	$ 175
MFE LCW System Capacity	800
Miscellaneous small projects	25

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations　　2. Project No. 84-ER-109

9. Purpose, Justification of Need for, and Scope of Project (continued):

Princeton Plasma Physics Laboratory		$1,000
Experimental Area Building Alterations	$ 500	
Upgrade Electrical Service	275	
Major Alterations and Modifications at various locations	100	
Miscellaneous small projects	125	
Oak Ridge Natonal Laboratory		$4,200
Replace Elevator 2, Biological Research Facility	$ 417	
Hood Exhaust Duct	473	
Balance Negative Air Pressure	660	
Replacement of Roof Mounted Air Conditioners	360	
Stack Monitoring System	200	
Coal Yard Runoff Sludge Removal	200	
Laboratory Addition and HVAC Improvements	630	
Additional Laboratories in TRL	250	
Ion Beam and Laser User Facility, Phase II	350	
Electrical Upgrade	360	
Refacing Exterior Walls, Biological Research Facility	250	
Miscellaneous small projects	50	

10. Details of cost estimate:

Not available at this time.

11. Method of performance:

Design and engineering will be on the basis of negotiated subcontracts and construction work under fixed price subcontracts awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 84-ER-109

12. Funding schedule of project funding and other related funding requirements:

This item does not apply to general plant projects.

13. Narrative explanation of total project funding and other related funding requirements:

This item does not apply to general plant projects.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Research
Energy Supply Research and Development - Plant and Capital Equipment
Magnetic Fusion Energy

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

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3. Date A-E work initiated: 1st Qtr. FY 1978

3a. Date physical construction starts: 2nd Qtr. FY 1978

4. Date construction ends: 3rd Qtr. FY 1986[b/]

5. Previous cost Estimate:
Date: 12/81 $243,600[a/]

6. Current cost estimate: $243,600
Less amount for PE&D: 400
Net cost estimate: $243,200
Date: December 1982

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978	$ 94,200	$ 14,000	$ 14,000	$ 6,567
1979	0	40,000	39,989	24,406
1980	0	28,200	28,179	36,066
1981	25,000	25,000	25,031	28,108
1982	39,858	39,858	39,858	33,241
1983	40,000	40,000	40,000	31,205
1984	44,142	30,000	30,000	30,000
1985	0	26,142	26,143	41,259
1986	0	0	0	12,348

[a/] Includes 400,000 PE&D funding.

[b/] The completion date for the MFTF-B project is the same as presented in the FY 1983 budget, however, the completion of auxiliary component installation and integration will be delayed to the end of the 2nd Quarter FY 1987.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

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8. Brief Physical Description of Project

This project provides: (1) for modification of an existing building to house a magnetic mirror test device; (2) for fabrication and installation of major components to comprise the mirror test apparatus; and (3) for construction of laboratory and office space with approximately 150,000 gross square feet.

The research device will be housed in an existing building which will require some modifications; i.e., relocation of existing shielding block walls, extension of the existing shielded pit, reinforcement of the pit foundations, removal of existing experimental apparatus, and extension of one end. The test apparatus will consist of the vessel, superconducting magnet systems, the vacuum system, the liquid helium cryoplant, the power distribution system, the support structure, and machine controls. When these items are fabricated and assembled, the capability to produce a tandem mirror magnetic field, a vacuum and high voltage power will be provided for use in the performance of tandem mirror-confined fusion experiments. First activities in this test device will involve prototype development, testing and evaluation of plasma streaming gun systems, ion cyclotron resonant heating devices, high field magnet inserts, startup neutral beam systems, sustaining neutral beam modules, radio frequency injectors, magnet warm liners, source isolation valves, and various beamline components. The tandem mirror apparatus coupled with the proper combination of prototypical components will provide the experimental machine configuration to pursue stated physics goals and objectives. The office building will be a two story structure constructed of low maintenance cost materials.

9. Purpose, Justification of Need for and Scope of Project

The previous data sheet reflected a major rescope of MFTF to MFTF-B which was approved by the Congress for FY 1981. A succession of experimental and theoretical advances with tandem magnetic mirror systems (late 1979 and early 1980) has provided the impetus for this rescope. Results from the small scale Tandem Mirror Experiment at LLNL showed that the tandem combination of two mirrors connected by a central cell provides significantly improved plasma confinement. In addition, analytical results and separate effects tests of recently invented thermal barriers indicated that MFTF, if configured in the tandem mode with thermal barriers, should achieve plasma parameters at a level of reactor significance. Based on the aforementioned results, we are now proceeding into this new regime of experimentation in the Mirror Fusion Test Facility-B. The test apparatus in the facility will provide the foundation to extend mirror physics parameters into the reactor regime, a factor of 100 beyond those of present experiments. An axicell magnet configuration will be incorporated in MFTF-B in order to enhance physics performance, increase experimental flexibility and provide for operational consistency (in both physics and engineered systems) with the currently planned arrangement for a commercial tandem mirror reactor.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

9. Purpose, Justification of Need for, and Scope of Project (continued):

The overall objective of the project's test apparatus is to provide a testing ground for the physics technology experiments which will produce the data base necessary for design of experimental power reactors. Accordingly, the test apparatus must be sufficiently flexible to demonstrate that mirror physics is well understood, to serve as a technological prototype for an experimental power reactor and to provide sufficient size to test the theoretical scaling laws of all known instabilities. From a physics standpoint, experiments in the test portion of the facility will provide a definitive test of the physics scaling laws---size, temperature and confinement. Furthermore, experiments will address the theoretical scaling laws for microinstabilities and explore the scaling laws for the convective loss-cone mode. The test apparatus, with appropriately attached component prototypes, is an ideal size for experiments to demonstrate plasma confinement at reactor level conditions.

From an engineering standpoint, the Mirror Fusion Test Facility will provide a valuable test of desirable components for potential mirror reactors. These components include: superconducting niobium-titanium magnets, cryopumps, a vacuum system, neutral beam sources, radio frequency injectors and power supplies. Also, the final test apparatus is capable of quasi-steady-state 30 second operation. Since the ultimate goal of mirror fusion reactors is steady-state operation, this is an important device parameter. The experience gained in design, construction and operation of the device and the information gathered in physics and engineering will provide a sound foundation for the design candidacy for the experimental power or demonstration reactor. From an overall fusion program perspective, it is important to complete MFTF-B at an early date and begin operations so that a timely comparison can be made between the tandem mirror and tokamak confinement approaches.

The laboratory and office portion of the facility is necessary because the mirror program is accelerating in many areas; for example, computer simulation, neutral beam development, direct conversion, superconducting magnets and reactor design. The growth in these areas has intensified long-standing housing problems. The additional staff will be temporarily housed in new trailer complexes resulting in existing and temporary office space being fragmented and poorly located in relationship to each other and the program's laboratory and computer buildings. This fragmentation will entail as much as one-quarter mile separation between various elements of the program effort. The laboratory space will provide flexibility for maximum utilization of the MFTF-B facility.

The $30,000,000 requested in FY 1984 provides for continuation of the engineering and fabrication of the major MFTF-B subsystems (magnet, vessel, cryogenics, etc).

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

9. Purpose, Justification of Need for, and Scope of Project - (continued):

Other project costs are (1) expense funded equipment such as magnet liners and high field inserts, gyrotron systems components, neutral beams and sources, and diagnostic equipment, startup neutral beam power supplies and an ICRH heating system, about $106,127,000; (2) research and development to perform analyses of plasma conditions and perform development on device hardware, about $19,640,000; and (3) other costs such as integrated facility tests, preparation for operations and operator training, spare parts, maintenance of completed MFTF-A systems during construction of the remaining MFTF-B systems, etc., about $24,517,000. In the area of expense funded equipment, it is planned to utilize cost participation arrangements with industry on some of the systems beginning in FY 1983 and continuing through completion.

Anticipated operating costs after completion are estimated to be in the range of $50,000,000 per year (FY 1984 dollars).

10. Details of Construction Project Cost Estimates*

	Item Cost	Total Cost*
a. Engineering, design and inspection at approximately 19% of construction costs, item b ...		$ 36,000
b. Construction costs		189,233
(1) Improvements to land, including grading, roads, paving, area lighting and landscaping	$ 900	
(2a) New building, approximately 150,000 sq. ft. at $ 66.66 per sq. ft.	10,000	
(2b) Building modifications	9,000	
(3) Special facilities	167,333	
(4) Utilities, including (mechanical) communications and electrical power	2,000	
c. Standard Equipment		1,300
d. Removal cost less salvage - demolition and removals		800
Subtotal		227,333
e. Contingency at approximately 8% of above costs		15,867
Total Construction Project Cost		$243,200

*Excludes PE&D funds. Escalation is included at 9% per year.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

11. Method of Performance

Design of conventional facilities will be on the basis of a negotiated architect-engineer contracts and design of special facilities will be by LLNL and industry under various fixed-price and cost-type contract arrangements. To the extent feasible, construction and procurement will be accomplished by fixed-price contract awarded on the basis of competitive bidding. The design and fabrication of most of the superconducting magnets will be accomplished by industry under a cost-type contract. Minor architect-engineering work, preparation and activation will be performed by Livermore forces.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Project Related Funding								
1. Total Project Funding								
(a) Construction line item	$ 95,147	$ 33,241	$ 31,205	$ 30,000	$ 41,259	$ 12,348	$ 0	$243,200
(b) PE&D	400	0	0	0	0	0	0	400
(c) Inventories	985	1,049	527	4,430	4,856	5,330	39	17,216
Total facility costs	96,532	34,290	31,732	34,430	46,115	17,678	39	260,816
2. Other Project Funding								
(a) Expense funded equipment	10,949	3,735	5,669	17,315	31,793	36,934	3,999	110,394
(b) R&D necessary to complete construction	14,146	1,872	1,637	1,884	1,294	0	0	20,833
(c) Other proj. related costs	3,804	2,391	1,129	1,371	2,914	5,300	1,048	17,957
Total other proj. funding	28,899	7,998	8,435	20,570	36,001	42,234	5,047	149,184
Total project funding	$125,431	$ 42,288	$ 40,167	$ 55,000	$ 82,116	$ 59,912	$ 5,086	$410,000

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California
2. Project No.: 78-3-a

12. Funding Schedule of Project Funding and Other Related Funding Requirements (continued)

b. Estimated Operational Funding Requirements

	Annual Estimates*
1. Facility operating costs	$25,000
2. Programmatic expenses directly related to facility	20,000
3. Capital equipment not related to construction but related to operation of the facility	5,000
Total Other Related Annual Funding Requirements	$50,000

* Estimates are in FY 1984 dollars.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding - Escalation is included at annual rates of 9%.

1. Total facility costs

(a) Construction line item - Description is provided in sections 8 and 9.

(b) PE&D - Preliminary engineering and design funds.

(c) Inventories - Includes the spare parts for MFTF-B device systems and the maintenance costs for protecting and maintaining completed systems in safe operating condition.

2. Other project funding

(a) Expense funded equipment

Included are various auxiliary components such as the magnet liners and high field magnet inserts, ICRH system components, diagnostic equipment, neutral beam source modules and beamlines, gyrotrons and ECRH system components and startup neutral beam power supplies. These are items which will be subject to prototype development and later modifications to meet the changing needs of various experiments in the MFTF-B facility. A portion of the cost of these auxiliary components is anticipated to be contributed by industry through cost participation contract arranagements.

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California | 2. Project No.: 78-3-a

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (continued)

(b) R&D necessary to complete construction

This includes the following: the performance of analytic studies and development of computer codes needed for design and fabrication of the complex magnet structure (coil winder, prototype coil case), the performance of studies to establish neutral beam and radiofrequency injector requirements and the performance of transient analysis for startup simulations, development of prototype neutral beam sources and gyrotron tubes. Also included is design and development of experimental diagnostics for determining plasma parameters. In addition, development of instrumentation and control systems, thermal absorbers, source cables and auxiliary components are required.

(c) Other project related costs.

This category includes costs for integrated system tests, preparations for operations, operator training, spare parts, and maintenance of completed device systems while the remaining systems are being completed. These costs are shown in items a.1.(c) and 9.2.(c) in the item 12 funding schedule above.

b. Total related funding requirements

1. Facility operating costs

The facility is estimated to operate for a period of ten years. The major elements comprising the annual operating costs will be personnel salaries, maintenance, spare parts, and utilities.

2. Programmatic operating expenses directly related to the facility.

The programmatic operating expenses directly related to the facility will be salaries for staff personnel (physicists and engineers) to carry out the experimental program.

3. Capital equipment not related to construction but related to the programmatic effort in the facility.

Capital equipment not related to construction but related to the programmatic effort is estimated to be about $5,000,000 annually in FY 1984 dollars.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reverse Field Pinch, ZT-H
Los Alamos National Laboratory
Los Alamos, New Mexico

Total Estimated Cost (TEC): $15,000,000
(For Design and Construction)

The Energy Research Analysis (ERA) program provides the capability for independent, rigorous assessment of the base of research that underlies a variety of energy technologies. Assessments are consolidated under one organization, the Office of Energy Research, in fulfillment of legislated responsibility for the Director to advise the Secretary on the agency's research and development programs.

The University Research Support (URS) program consists of two major subprograms and a set of program activities focused on the following three primary objectives: To strengthen university capability to do energy research; to strengthen the quality and increase the number of students interested in pursuing energy-related professional careers; and to enhance technology transfer activities through cooperative research efforts between universities, the agency's national laboratories and private industry. The first subprogram, the University/National Laboratory Cooperative Research Program, is directed at strengthening the capabilities of both universities and national laboratories as major energy research performers in the conduct of long range energy research. Many of the activities supported within this subprogram involve joint efforts between university and laboratory-based researchers. The second subprogram, the Energy Manpower Development Program, includes efforts to increase the number of students pursuing energy-related engineering and science careers. This subprogram also includes the Department's statutory responsibility for assessing the supply and demand of manpower for both current and projected energy R&D programs.

The University Research Instrumentation (URI) program supports the purchase by the major research universities of state-of-the-art, scientific instrumentation used in energy-related research areas such as combustion, biological energy conversion, catalysis, radioactive waste management and engineering research.

The goal of the Multiprogram General Purpose Facilities (MGPF) program is to provide for the rehabilitation and replacement of general support facilities required to continue the operation of the agency's multiprogram laboratories. MGPF include facilities which are suited to many different users and programs; these are roads, railroads, site utilities, and support buildings such as laboratories, office buildings, shops, warehouses, etc. They are restricted to facilities where no one program uses more than approximately 60 percent of the facility.

The replacement cost of the existing general purpose facilities at the multiprogram laboratories is over $8,000,000,000. The MGPF program is required to maintain this investment and to ensure its viability. The program will be required as long as the multiprogram laboratory facilities are utilized to perform research and development functions for the agency. The program is an appropriate Federal role reflecting the responsible management of the Government's real property. The program is based on the premise that through continuous usage and aging, facilities deteriorate over time to a point where they are no longer useful to perform their intended functions and must be rehabilitated or replaced.

Advisory and Oversight Program Direction provides funds for the personnel resources required by the Director of Energy Research to carry out his responsibilities specifically assigned by legislation (P.L. 95-91) as well as those mandated by the Secretary in areas beyond the scope of the Energy Research and development program in order to advise the Secretary with respect to the well-being and management of the multiprogram laboratories; supervising or supporting research activities carried out by any of the Assistant Secretaries; and providing for program management of the Energy Research Analysis, University Research Support, and Multiprogram General Purpose Facilities programs. The program provides funds only for the salaries and related personnel expenses for the personnel who carry out the studies, analyses, monitoring and coordination activities required to support the Director. It does not include any funds for outside contracts.

The Office of Energy Research Policy and Management program provides for the salaries and related expenses associated with staff in the immediate office of the Director, Office of Energy Research, and in the Office of Management.

Reversed Field Pinch, ZT-H
Los Alamos National Laboratory
Los Alamos, New Mexico

Total Estimated Cost (TEC): $15,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1984 Estimate		FY 1985 Estimate		FY 1986 Estimate		FY 1987 Estimate		FY 1988 Estimate		Total Project Funding
	Obs.	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	
Fabrication												
Operating Expenses	$ 0	$ 1,000	$ 1,000	$ 4,000	$ 4,000	$ 6,000	$ 6,000	$ 4,000	$ 4,000	$ 0	$ 0	$15,000
Subtotal	0	1,000	1,000	4,000	4,000	6,000	6,000	4,000	4,000	0	0	15,000
Related Funding Requirement												
R&D Support of Fabrication	0	0	0	1,500	1,500	2,000	2,000	2,600	2,600	2,600	2,600	8,700
Subtotal	0	0	0	1,500	1,500	2,000	2,000	2,600	2,600	2,600	2,600	8,700
Total Project	$ 0	$ 1,000	$ 1,000	$ 5,500	$ 5,500	$ 8,000	$ 8,000	$ 6,600	$ 6,600	$ 2,600	$2,600	$23,700

Description, Objective and Justification

The presently operating ZT-40 device has achieved outstanding experimental results which surpass the design specifications for this device, specifically experimental duration has reached 20 milliseconds exceeding the design goal of 2 millisecond. During the recent review of certain fusion development issues, the Magnetic Fusion Advisory Committee recommended proceeding with the physics exploration of the reversed-field-pinch concept. The importance of extending the current capability to values in the mega-ampere range in order to test energy confinement was emphasized. As a result, a device similar in size to ZT-40 will be fabricated which will have an initial current performance of 600 kA, similar to the present ZT-40, and upgradable to 2 MA. This will bring to the fusion program an experimental capability that increases first wall heat flux, provides information on tokamak-like operating modes, high magnetic field shear, physics of MHD beta limits, and MHD minimum energy states.

The device will consist of a new discharge chamber with an enlarged (with respect to the present device) diameter first wall, air core inductive power transfer, motor-generator power supply, and a variable toroidal current from 0.6 to 2.0 MA. Technical goals will include minimization of magnetic field errors, design of plasma limiters for high heat flux, first-wall thermal loading (1.5 to 5 MW/m^2), and steady state operational capabilities.

Fabrication will be carried out in FY 1985-FY 1987 and installation will be completed in FY 1988.

Reversed Field Pinch, ZT-H
Los Alamos National Laboratory
Los Alamos, New Mexico

Total Estimated Cost (TEC): $15,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Schedule of Planned Activities

	Start	Completion
Device Design	1st Qtr. FY 1984	2nd Qtr. FY 1985
Long Lead Procurement	4th Qtr. FY 1984	4th Qtr. FY 1885
Fabrication and Installation	2nd Qtr. FY 1985	4th Qtr. FY 1987

Management and Contracting

The device design and fabrication will be managed by Los Alamos National Laboratory (LANL), Los Alamos, New Mexico.

Current Year Expectations

Not Applicable.

Budget Year

During FY 1983, the preliminary design will be completed.

Reasons for Increases and Decreases

None.

Cost Estimate

(Cost estimate is preliminary)

Engineering and Design	$ 2,000
Procurement and Fabrication	9,100
Assembly and Installation	1,100
Management Reserve (25%)	2,800
Total	$ 15,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Doublet III ECH Heating Project
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $8,400,000
(For Design and Construction)

Doublet III ECH Heating Project
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $8,400,000[a]

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Year	FY 1982 Actual			FY 1983 Estimate		FY 1984 Estimate		FY 1985 Estimate		Total Project Funding
	Obs.	BA	Obs.	BO	BA	BO	BA	BO	BA	BO	BA
Fabrication:											
Operating Expenses......	$ 990	$2,237	$2,237	$1,830	$2,350	$2,350	$2,000*	$2,000	$ 823	$1,230	$8,400
Related Funding Requirement											
R&D Related to Construction...........	0	200	200	200	250	250	0	0	0	0	450
Total Project Funding...	$ 990	$2,437	$2,437	$2,030	$2,600	$2,600	$2,000	$2,000	$ 823	$1,230	$8,850

Description, Objective and Justification

This wave heating project is proceeding in parallel with the development of high power, 60 GHz gyrotrons in the Development and Technology subprogram. Electron Cyclotron Heating (ECH) is anticipated to be a very useful auxiliary heating technique for tokamaks (either for the bulk plasma or for profile modification), and to date has been limited by the tube technology. Developments of pulsed tubes at 28 GHz provided a good basis for planning a major heating project at 60 GHz which corresponds to a higher magnetic field of 20 kG. In FY 1980, the Doublet III device located at the GA Technologies, Inc. in San Diego, California, was chosen to be the site of this experiment. Doublet III is particularly suited for the experiment because of the 20 kG standard operating field and the requirements for ECH heating in the plasma shaping and beta study programs. However, it should be noted that although this project is being constructed at GA Technologies, Inc., the components will be flexible enough to use this RF heating experiment at another site, if needed. The projected total ECH power to be supplied is 2.0 MW. The project will proceed in two phases with the first MW being available by the end of FY 1983. The second MW was originally scheduled to be installed by the end of FY 1984. However, because Doublet III will not operate during FY 1985 because of the installation of the new Dee vacuum vessel, it has been decided to phase the installation of the second MW with the vacuum vessel installation. The installation of the second MW will therefore be delayed until FY 1985 and will be available when operations of the new vacuum vessel begin at the end of FY 1985. The equipment will be built by GA Technologies, Inc. and be physically located on GA Technologies, Inc. property.

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[a] The total estimated cost of the ECH experiment is based on the projected cost of a system of the 60 GHz gyrotrons (now under development) which would deliver up to 2.0 MW of ECH heating power to Doublet III.

* Funding profile presumes installation of the D III-D vacuum vessel.

Doublet III ECH Heating Project
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $8,400,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Schedule of Planned Activities

	Start	Complete
Conceptual Design	3rd Qtr. FY 1980	4th Qtr. FY 1980
Detailed Design and Long Lead Procurement	1st Qtr. FY 1981	4th Qtr. FY 1981
Construction	3rd Qtr. FY 1981	3rd Qtr. FY 1985
Startup/Operation	4th Qtr. FY 1983 (1.0 MW) 4th Qtr. FY 1985 (2.0 MW)	

Management and Contracting

This project will be managed by GA Technologies, Inc., San Diego, California, under separate contract.

Prior Year Achievements

Completed testing of prototype system components. Procured first four long pulse gyrotrons. Operated short pulse (100 msec) systems on Doublet III at power levels up to several hundred kilowatts.

Current Year Expectations

Complete installation of the nominal one MW system on Doublet III.

Reasons for Increases and Decreases

An increase in total project funding of approximately $400,000 is due primarily to an increase in the cost estimate for procurement of the 60 GHz gyrotron tubes and a delay of 1 year in the installation schedule.

Doublet III ECH Heating Project
GA Technologies, Inc.
San Diego, California

Total Estimated Cost (TEC): $8,400,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Cost Estimate

The TEC is based on projected costs of the needed microwave tubes now under development. As such it should be regarded only as the best estimate that can be given at the present time.

Engineering & Design	$ 1,240
Construction Costs	6,020
Fee	380
Subtotal	7,640
Contingency @ 13%	760
Total	$ 8,400

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Basic Energy Sciences
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Basic Energy Sciences (BES)				
Materials Sciences				
Operating Expenses........	$ 95,506	$108,700	$108,700	$125,110
Capital Equipment.........	7,960	8,510	8,510	12,780
Construction..............	600	3,000	3,000	29,340
Subtotal................	104,066	120,210	120,210	167,230
Chemical Sciences				
Operating Expenses........	63,187	70,000	70,000	75,500
Capital Equipment.........	4,940	5,510	5,510	6,520
Construction..............	0	400	400	450
Subtotal................	68,127	75,910	75,910	82,470
Nuclear Sciences				
Operating Expenses........	22,407[a]	30,644[c]	30,644	37,900
Capital Equipment.........	860[b]	1,556[c]	1,556	2,150
Construction..............	0	0	0	270
Subtotal................	23,267	32,200	32,200	40,320
Engineering, Mathematical and Geosciences				
Operating Expenses........	24,864	31,050	31,050	33,670
Capital Equipment.........	1,900	1,920	1,920	2,120
Subtotal................	26,764	32,970	32,970	35,790
Advanced Energy Projects				
Operating Expenses........	7,310	8,300	8,300	9,100
Capital Equipment.........	320	290	290	310
Subtotal................	7,630	8,590	8,590	9,410
Biological Energy Research				
Operating Expenses........	8,419	9,500	9,500	10,580
Capital Equipment.........	410	370	370	400
Subtotal................	8,829	9,870	9,870	10,980
Program Direction				
Operating Expenses........	2,500	3,100	3,810	3,970
Subtotal................	2,500	3,100	3,810	3,970
Total				
Operating Expenses..........	224,193	261,294	262,004	295,830
Capital Equipment...........	16,390	18,156	18,156	24,280
Construction................	600	3,400	3,400	30,060
Basic Energy Sciences.........	$241,183	$282,850	$283,560	$350,170
Staffing FTP/Total FTE's......	52/56	54/60	54/60	58/62

Authorization: Section 209, P.L. 95-91

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[a] Operating funds of $12,257,000 previously budgeted in this subprogram for low energy nuclear physics research are now being budgeted in the Nuclear Physics program.

[b] Capital equipment funds of $510,000 previously budgeted in this subprogram for low energy nuclear physics research are now being budgeted in the Nuclear Physics program.

[c] Reflects the transfer of the Stanford Synchrotron Radiation Laboratory from the National Science Foundation to the Nuclear Science subprogram. Funds associated with this facility are $6,800,000 in FY 1983.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Basic Energy Sciences
(dollars in thousands)

FY 1983 Appropriation	$282,850
o Sustain program elements at the comparable FY 1983 level	+ 15,370
o Provide for the modest increases in each subprogram in the most promising new research areas; provide increases required for facility operations, GPP and AIP; and enhance the research capability of the program by equipment replacements and additions (e.g., for the ORNL calutrons)	+ 10,780
o Provide for an advanced materials research initiative which will include two major construction projects and directly related research and equipment. The new construction projects are a National Center for Advanced Materials at LBL and an expansion of capability at the National Synchrotron Light Source at BNL	+ 38,000
o Provide for the Heavy Ion Fusion Research program which is a new program under the aegis of Basic Energy Sciences having previously been funded by Defense Programs	+ 5,000
o Provide for increased funding for staff salary and benefits and the addition of 2 full-time equivalents above the revised FY 1983 level	+ 870
o Construction funds for the Improvements to the Weapons Neutron Research Facility were provided in FY 1983 and will not be required in FY 1984	- 2,700
FY 1984 budget	$350,170

Overview

The Administration has taken the strong position that the achievement of the Nation's economic goals will depend in large part on knowledge produced by a strong, broad national science capability. Cost analyses by leading U.S. economists have shown that half the growth in the productivity of the United States is due to the advance of scientific knowledge. In its determination of the appropriate Federal roles in the support of RD&D, the Administration has identified the support of long range basic research as the particular responsibility of government and further, that "mission agencies should support the foundation of basic science, as well as mission-oriented applied research, in appropriate disciplines." Further, both the Congress and the Administration have focused attention on the particular importance to U.S. economic well being of advancing knowledge and capabilities in the material sciences.

Improvements in existing technology and the development of new technologies invariably come from the application of new scientific knowledge. External blue ribbon review groups have repeatedly recommended that Government agencies increase funding of basic research and have called for the Office of Basic Energy Sciences (BES) to be given a larger role in developing the needed technology base for the different energy supply and conservation options. BES has endeavored to respond to these recommendations. The major product of the BES program is the knowledge relevant to energy exploration, production, conversion and use; that product becomes a part of the body of information on which the applied technologies rest. While the pursuit of research by BES to broaden the technology base needed for identified energy technology options is extremely important, perhaps even more important is the need for basic research unconstrained by preconceived notions of what technologies will be important several decades from now, so that new, currently unidentified options may emerge.

In support of basic research activities, BES has recently completed construction of three important user facilities: the National Synchrotron Light Source (NSLS), the Intense Pulsed Neutron Source (IPNS), and the 1.5 MeV electron microscope at LBL. FY 1983 will be the first full year of operation of these newer facilities. Also in FY 1983, the Atomic Resolution Microscope, delivered in FY 1982, will begin operation and BES will undertake the responsibility for the operation of the Stanford Synchrotron Radiation Laboratory (SSRL), our second major research facility for synchrotron radiation. In addition, FY 1982 has been the first full year of operation of the Combustion Research Facility. A commitment to continuity of current productive activities, real growth in specified areas, and a new Advanced Materials Research initiative is required to implement stated national policy in the FY 1984 budget.

Examples of how basic research discoveries can enhance the energy alternatives available to us and improve our understanding of energy-related phenomena are discussed below in each of the subprogram areas.

In the Materials Sciences subprogram the thrust is towards understanding basic phenomena related to the structure and properties of materials. This past year saw the first experimental observation of a new phase in a rare earth-rhodium boron alloy, a phase in which, unexpectedly, the properties of ferromagnetism, oscillatory magnetism and superconductivity coexist. This subprogram also provided new research results on stress corrosion cracking, results that are being used to evaluate intergranular corrosion of the nickel base alloys being used in nuclear plant steam generators, and it developed new information explaining radiation instability of a component planned for use in a long term storage "host" for nuclear waste.

Under the Chemical Sciences subprogram a considerable improvement was attained in the precision of measurement of the ratio of the sulfur-32 isotope to sulfur-34 in air. This improvement is critical to establishing a reliable measurement technique that could be used to distinguish among possible sources of sulfur present in acid rain. A second accomplishment was the experimental observance of a phenomenon in light-excited semiconductors which had been theoretically predicted and, if harnessable, could lead to a doubling in the efficiency of photoelectrochemical solar devices.

Several accomplishments under the Nuclear Science subprogram related to nuclear waste isolation include evidence that plutonium immobilized in glass being considered for ultimate disposal can be affected by chemically active leachants generated in the aqueous medium by the high radiation field itself. This new insight on the effect of radiation on the glass host/aqueous leachant system can affect key decisions in this area. It was also found in studies of the binding of actinides to naturally occurring organic materials that the migration of plutonium through soils rich in these materials would be very slow. Certain forms of the actinide nuclear wastes become strongly bound to organic humic materials, and thus, are essentially inert to further chemical reactions.

Under the Engineering, Mathematical and Geosciences subprogram, an applied math effort involving "automated reasoning" provided an elegant solution to the problem of showing that single component failures could not inhibit nuclear reactor shutdown; this solution was needed to verify a condition required for nuclear plant licensing. A geosciences effort showed that Columbia River basalts have chemical properties that can provide a safety factor for the immobilization of long lived actinides such as neptunium.

A recent accomplishment under Advanced Energy Projects has been the demonstration of the scientific feasibility of producing batteries, both storage and primary, with electrodes made of light polyacetylene sheets (rather than lead). The successful demonstration of this concept can pave the way for a whole new technology and considerably improve the outlook for electrically powered vehicles.

The Biological Energy Research subprogram has made progress in determining how plant systems "sense" temperature. While there is much to learn about this process, it is an extremely important area of endeavor; plants initiate adaptive processes in response to the environment. Control of such responses could ultimately lead to artificially adapting plants for specific environments, e.g., for producing biomass in geographic locations areas where it is not now economically feasible.

BES considers the merits of research in relation to the diverse needs for energy development and selects those topics that, when taken as a whole, comprise an optimum, balanced program of mission-oriented basic research. To carry out this program, BES plans, supports and administers energy related research in the physical and biological sciences, engineering and applied mathematics. New scientific information in these areas addresses the Administration's goals by providing the fundamental scientific and engineering base on which the Nation's future energy options depend. The strategy is to:

o Provide critical knowledge and data and develop trained scientific talent through support of highly competent scientists in DOE mission areas;

o Provide for, and support operation of unique, specialized research facilities;

o Maintain liaison with other energy programs, federal agencies and the scientific, academic and industrial communities;

o Seek the scientific and industrial communities' assistance for the identification of needs and opportunities for research in areas likely to be relevant to future energy options; and

o Promote early applications of the results of basic research.

Research carried out by the Basic Energy Sciences program provides knowledge that cuts across the missions of all of the energy technology development programs.

At the heart of this strategy is the need for program continuity concurrent with reasonable opportunities for growth in newer, emerging areas of science. To continue its effectiveness, the Basic Energy Sciences program must: 1) maintain a strong core program -- this involves equipping, supporting and encouraging the scientists involved in our current program activities, 2) have growth opportunity to exploit new, emerging areas that have been identified as having great potential importance to energy, and 3) continue to support existing, unique facilities important to research in the U.S. while at the same time providing for needed new facilities and for their operation.

A prime example of the importance of an opportunity for growth is the relatively new field of synchrotron radiation research. A National Academy of Science (NAS) study conducted in 1976 outlined opportunities for synchrotron radiation research and is the basis for current U.S. efforts. The National Synchrotron Light Source construction at BNL was supported by the NAS report findings; many of the areas outlined in the early report are now under intense investigation. The Stanford Synchrotron Radiation Laboratory at Stanford University (SLAC) also was expanded in response to the opportunities identified in 1976. Only because the U.S. Government had the foresight to provide the additional support needed to construct, and now to operate, these facilities has the U.S. established a lead role in this area. Through these and similar unique facilities, industrial and academic scientist users, are provided the capability for research not otherwise available to them. New opportunities and areas of research are emerging that were not conceived of six years ago when the NAS study was carried out. In FY 1984 a new Advanced Materials Research initiative is proposed which will include a new synchrotron radiation source and expansion of capability at NSLS to further expand and exploit opportunities in the field of materials sciences and other fields. In addition, a new Heavy Ion Fusion Research program will be initiated to advance the accelerator technology for this very promising inertial confinement fusion approach.

At the FY 1984 request level, BES is seeking $350,170,000: 1) $295,830,000 for operating expenses, 2) $24,280,000 for capital equipment, and 3) $30,060,000 for construction. Of the operating and equipment increase, $15,370,000 provides for a cost of living allowance. The remaining increase for operating and equipment will: 1) include replacement equipment for the ORNL calutrons, purchase of initial components for an advanced analytical electron microscope, ion-implantation equipment, and special equipment for the NSLS and several other facilities; 2) provide for funding needed above the allowed cost of living for the operation of new user facilities and for new fuel element fabrication for HFBR and HFIR; 3) provide for modest increases in each of the subprograms in some of the most promising new research areas; 4) permit an Advanced Materials Research initiative to be started that is responsive to Congressional interest in materials research and is in consonance with the President's material policy statement; 5) initiate a program in Heavy Ion Fusion Research; and 6) provide for increased personnel costs and for an increase equivalent to two full-time staff years for program direction.

The requested construction funds will permit initiation of construction projects required under the proposed Advanced Materials Research initiative ($28,400,000): 1) a National Center for Advanced Materials ($25,900,000) and 2) the expansion of capability at the recently dedicated National Synchrotron Light Source ($2,500,000); and also permits implementation of several much needed Accelerator and Reactor Improvement Projects and GPP projects ($1,660,000).

Further description of the FY 1984 budget request is given below in the seven major subprograms which make up Basic Energy Sciences. These are 1) Materials Sciences; 2) Chemical Sciences; 3) Nuclear Sciences; 4) Engineering, Mathematical and Geosciences; 5) Advanced Energy Projects; 6) Biological Energy Research; and 7) Program Direction.

	FY 1982	FY 1983	FY 1984 Request
Materials Sciences			
Operating Expenses	$ 95,506	$108,700	$125,110
Capital Equipment	7,960	8,510	12,780
Construction	600	3,000	29,340
Subtotal	$104,066	$120,210	$167,230

The goal of the Materials Sciences subprogram is to increase our understanding of phenomena and properties important to materials behavior which will contribute to meeting the needs of present and future energy technologies. It is well known that materials problems and limitations often restrict the performance of current energy systems and the development of future systems. A few examples of such problems and limitations include: low conversion efficiency in photovoltaic materials, radiation damage in fusion systems, thermal and mechanical stability of materials for heat engines, and corrosion and erosion of critical components in coal conversion plants. The Energy Research Advisory Board has placed the highest relative program ranking on this area of research in a recent review of major energy activities Science and Technology base programs.

This year, in response to Congressional interest in materials research and in consonance with the President's materials policy statement, an Advanced Materials Research initiative is being proposed. This new initiative is described separately and builds upon the base of knowledge established by the Materials Sciences program and other such programs in the Government. It will complement ongoing core program activities, emphasize high risk, high pay-off research with potential for technology transfer, and assure United States leadership in the field of materials science.

The FY 1984 request includes funds for the Core Program, $117,410,000 for operating, $10,880,000 for capital equipment and $940,000 for construction and for a new initiative on Advanced Materials Research, $7,700,000 for operating, $1,900,000 for capital equipment, and $28,400,000 for construction.

The opportunities for significant advances in materials research are ripe for exploitation. The high flux sources of x-rays such as the recently dedicated National Synchrotron Light Source, permits studies of materials surfaces at unprecedented levels of detail and also under dynamic conditions. New microscopy facilities have begun operation. The recently installed LBL microscope, the highest voltage United States instrument, and the Atomic Resolution Microscope which will begin operation in FY 1983, will allow materials to be examined at resolutions important in the determination of materials properties. New pulsed neutron sources are being developed here and abroad which will be used to study the fundamental structure of matter in energy regimes never heretofore observed. These new instruments coupled with steady advances in theory and the ability to prepare new well characterized combinations of elements and structures (such as the layered ultrathin coherent structures and ion-implanted alloys) are ushering in a real opportunity for advancements in the entire materials technology field. The research area of surface modification is one where new developments are taking place which hold promise not only for improving properties, but also for reducing the quantity of critical/strategic materials needed. Ion implantation techniques coupled with laser annealing are being developed to a point where almost any combination of elements can be inserted into the surface of a material to improve its electrical, corrosion resistance, or mechanical properties.

Some of the needs to which the Materials Sciences research ultimately contributes include:

- Developing new or substitute materials
- Tailoring materials to satisfy defined requirements
- Predicting materials problems and service life

- Improving the ability to successfully attack unforeseen materials problems in advanced energy systems, and
- Improving the theoretical and experimental capability to analyze the fundamental structure of materials

To provide the new knowledge and information to meet these needs, Materials Sciences, comprised of the subfields of metallurgy, ceramics, solid state physics and materials chemistry, places emphasis on selected generic areas of fundamental importance and on areas where problems are known to exist or are anticipated. Some research is directed at a single energy technology (e.g., photovoltaic materials for solar energy conversion), some research would have applicability to many technologies simultaneously (e.g., embrittlement of structural materials due to the presence of hydrogen), and still other research has more fundamental implications underpinning all materials research (e.g., mechanisms of atomic transport of solids). The research is conducted among a variety of institutions - national laboratories, universities, and to a lesser extent, industry utilizing the talents of metallurgists, ceramicists, solid state physicists, and materials chemists.

This subprogram supports both directly and indirectly the activities of the Committee on Materials (COMAT) in developing a national position on critical materials. The ability to provide such support stems directly from the experience and continuity within the Materials Sciences subprogram. The fundamental understanding of materials obtained in this subprogram has led to new approaches to alloy design for critical materials substitution and conservation.

The subprogram utilizes workshops and reports of its Council on Materials Science (a non-Governmental body with representatives from academia, industry, and agency laboratories) to help focus on critical issues. Panel meetings on Radiation Effects and on the Role of Computation in Condensed Matter Research were conducted in 1981. During 1982, two panel meetings were held - Materials Research at High Pressure, and Materials Aspects of Nuclear Waste Isolation. The reports resulting from these workshops and panels are distributed widely, including publication in the open literature. Interactions and information transfer with the agency's applied materials research takes place through a number of mechanisms including a formalized Research Assistance Task Force. Recent examples include meetings on materials problems in molten carbonate fuel cells and constitutive equations of mechanical behavior in geological repository materials. Through these latter meetings the basic researchers learn of the problems in the applied programs and the technology oriented programs are exposed to scientists with a fundamental understanding of matter.

In addition to maintaining an appropriate mix among long-term science, multi-technology and single energy technology oriented research, a balance must be retained between forefront large facility-related research and small individual projects. Certain types of research simply cannot be carried out without large facilities (e.g., neutron sources with significant fluxes of neutrons cannot be made in "small" sizes). Also newer instruments with significant improvements in capability (e.g., synchrotron radiation sources) are very expensive to build and operate. The Materials Sciences subprogram utilizes several major facilities in the pursuit of its research goals, including the National Synchrotron Light Source (NSLS) BNL, High Flux Beam Reactor (HFBR) BNL, High Flux Isotope Reactor (HFIR) ORNL, Intense Pulsed Neutron Source (IPNS) ANL, Ion Implantation Facility ORNL, and High Voltage Electron Microscopes (HVEM) at ORNL, ANL and LBL. Operation of these facilities requires about 18 percent of the operating budget of the Materials Sciences subprogram, not including the unique research associated with them. These facilities also are available to qualified users outside the national laboratory complex.

Current emphases and trends in the core program indicate utilization of the major user facilities will increase. The university portion of the program will be maintained at about 20 percent. When including Ames Laboratory (Iowa State University) and Lawrence Berkeley Laboratory (University of California) the support going to universities is approximately 38 percent. Research will be strengthened in the areas of nuclear waste isolation, surface modification, interfaces, grain boundaries, condensed matter theory, amorphous materials, structural ceramics, critical materials substitution and non-destructive evaluation among others.

The Materials Sciences subprogram is the basic materials program in the agency underpinning all the energy technologies and over $400 million of applied materials R&D required by energy activities technology programs. That applied materials development commands a large fraction of the total materials R&D effort is testimony to the crucial role materials play in the development of energy systems. Coordination of the agency's materials programs takes place primarily through the Energy Materials Coordinating Committee. Within the Federal government, the subprogram is coordinated in part through the interagency Committee on Materials (COMAT). At the Federal program level, Materials Sciences represents about one-third of the Federal Government support for basic materials research.

Materials Sciences is recognized throughout the research community for its excellence. Past technical accomplishments have moved into the technological or commercial sector (e.g., radiation resistant alloys, glassy metals, ion implantation techniques for surface modification, and superconducting wire), and it is expected that through the proven methods of technology/information transfer and effective management this year's accomplishments will likewise find use either for building our fundamental base of materials understanding or in some technological application in the future. It should be noted that industrial interactions with this subprogram are encouraged and indeed have been successful. Significant progress was made during the past year in many areas of the subprogram. Some examples of recent accomplishments include:

- A new phase of matter was discovered at low temperature where ferromagnetism, oscillatory magnetism and superconductivity coexist. Present theory predicts this to be impossible.
- The radiation induced resistivity changes in copper were found to be significantly high; as a result, magnet designers are beginning to factor this data into the considerations of fusion reactor lifetimes.
- New research results on stress corrosion cracking (SCC) of alloys in aqueous solutions have shown the importance of borate ions (a threshold ratio of borate to thiosulfate ion) in inhibiting SCC. These results are now being used at the Three-Mile-Island steam generator to evaluate intergranular SCC of its nickel-base alloys.
- Interesting new results on cesium implanted into nickel have shown that hydrogen is strongly bound to cesium. This suggests the possibility of using cesium to prevent hydrogen embrittlement in critical components.
- Friction was found to be greatly reduced at iron surfaces as a result of ion implanted titanium and carbon. An amorphous ternary layer was observed to form from the process.
- An important new high temperature solar energy absorbing film was discovered. The material, zirconium diboride, was prepared by chemical vapor deposition and shows excellent long-term stability in air at 600°C.
- A new process for silver recovery was discovered that produces greater than 99.99 percent silver removal from photographic spent fixer solutions. Not only is it important for silver recovery, but it also meets stringent environmental standards for pollution levels of silver and cyanide in streams.
- Recent bulk measurements of radiation instability (swelling) of zirconolite under accelerated testing conditions were found to show significant instability in contrast to previous x-ray measurements. These new results may affect the use of zirconolite on a proposed synthetic ceramic nuclear waste host called SYNROC.

- Using radiation from a synchrotron radiation source, the surface structure and temperature distribution for silicon after laser heating were determined for the first time.

The request for the Materials Sciences core program will provide for needed continuity and permit a reasonable level of utilization of major facilities, strengthening of important topical areas and a start in some new thrust areas recommended by workshops and panels of the Council on Materials Science. Of the $8,710,000 increase in operating funds in the core program over FY 1983, the most significant amount is for inflation ($5,980,000) and $2,730,000 is to meet program commitments involving operation and research at newer major facilities. The operational funding for NSLS will increase, which together with the Chemical Sciences funding for NSLS will allow NSLS to run 13 shifts per week, a modest increase over FY 1983.

Additional funding will be allocated to the other major facilities for operational costs, for example to the LBL Center for Electron Microscopy in order to permit close-to-optimum outside use. FY 1984 will be the first full year of operation for the Center. The 1.5 MeV High Voltage Electron Microscope has begun operation and the Atomic Resolution Microscope should begin operation during FY 1983. These two microscopes will provide extremely powerful complementary instruments, the Nation's best, to examine the structure of materials. Strengthening of research on materials synthesis, pulsed neutron research at WNR/PSR-LANL, nuclear waste isolation and surface modification including ion implantation will be supported with funds in this request. Some major new thrusts which will be undertaken at a modest level include: alloy design for critical material substitution/conservation; computer simulation and theory; polymer research especially on polymers with high conductivity and corrosion resistance; high resolution electron microscopy, especially work associated with the new Atomic Resolution Microscope; support for new participating research teams to utilize the NSLS; and theory, modeling, and experimentation related to the quantitative predictive behavior of materials.

The increase in equipment funds will allow a start on the purchase of an advanced analytical electron microscope which will cost a total of about $1 million. The request will also allow purchase of ion implantation equipment to expand the user capability at ORNL. GPP ($300,000) funds are requested for Ames and Notre Dame; and Accelerator and Reactor Improvement funds are requested for NSLS ($500,000) and HFBR ($140,000) in the core program. Supporting information is provided in the construction project data sheet.

In addition to the Materials Sciences core program, funds for an Advanced Materials Research initiative are requested. This is an initiative carefully designed to satisfy a national need in materials science research and in response to Congressional interest and Administration policy. Funding for the initial year, FY 1984, includes operating expenses ($7,700,000), capital equipment ($1,900,000) and construction ($28,400,000).

United States economic health and national security requires the maintenance of a commanding lead in high technology and the reduction of vulnerability to critical and strategic imported materials.

In response to this challenge, an Advanced Materials Research initiative is proposed. The Advanced Materials Research initiative will be organized to provide maximum benefit to U.S. industry. Industry will participate in the design and use of the facilities to assure that the research addresses America's high-technology needs. For example, at the National Center for Advanced Materials (NCAM), an advisory board composed of scientific leaders from industry, universities, and Federal laboratories will advise the LBL director on NCAM scientific program directions. The NCAM affiliates, consisting of major research teams from industry and universities, will participate in the design, construction, and use of the Advanced Light Source (ALS), a new proposed synchrotron radiation source, and beam lines. An ALS program advisory committee will review research proposals for the use of ALS beam lines by all qualified experimenters. An NCAM Industrial Fellows program will be established to provide joint LBL-industrial support for participation at NCAM of outstanding industrial scientists in basic research studies of mutual interest to LBL and the scientists' parent companies.

This new initiative will include funds for: A) two construction projects (a National Center for Advanced Materials-$25,900,000 and the expansion of capability at the recently dedicated National Synchrotron Light Source-$2,500,000); B) research associated with construction $5,100,000; and C) a forefront research program $4,500,000.

	FY 1984 Request
A. Construction..	$ 28,400

National Center for Advanced Materials

The National Center for Advanced Materials project provides for the construction of four new facilities: 1) an Advanced Light Source (ALS); 2) a Surface Science and Catalysis Laboratory (SSCL); 3) an Advanced Materials Synthesis Laboratory (AMSL); and 4) an Advanced Device Concepts Laboratory (ADCL). As part of this project funds are provided for improvements at the Stanford Synchrotron Radiation Laboratory (SSRL). Each of these is described further below:

Advanced Light Source (ALS)

The ALS, which will deliver photon fluxes some 10,000 times those of present synchrotron light sources (in its optimum energy range) in pulses of about $3x10^{-11}$ sec duration, will be a major national asset. The ALS is designed to optimize photon fluxes in the energy range from 0.1 to 5000eV. It will thus complement the high photon energy facility at SSRL for the western part of the United States. Its unique time structure will permit the study of atomic motion and reaction kinetics on the 10^{-11} sec scale. Projections of usage indicate that the capacity of present synchotron light sources will be saturated by about 1984 and this project will meet those needs.

Surface Science and Catalysis Laboratory (SSCL)

The SSCL will further the fundamental understanding of surfaces of materials with a view toward applications and catalyzed processes on solid surfaces.

Advanced Materials Synthesis Laboratory (AMSL)

The AMSL will create a forefront facility for the synthesis and characterization of materials of novel or optimized physical or chemical properties.

Both SSCL and AMSL will build up upon the very strong programs in materials science and in surface science and catalysis already in existence at LBL.

Advanced Device Concepts Laboratory (ADCL)

ADCL will provide a focus for development of innovative devices and use of advanced materials to create among other things whole new types of advanced engines with new materials. Innovative device concepts for more sophisticated characterization of materials properties or behavior will be created.

Stanford Synchrotron Radiation Laboratory (SSRL)

A complementary program at the Stanford Synchrotron Radiation Laboratory (SSRL) will provide for construction of equipment to increase brightness of synchrotron radiation beams from the existing 4 GeV PEP storage ring, and for equipment to improve injection of electrons into SPEAR and to eliminate adverse effects of vibration of SPEAR performance. These improvements and new facility capabilities will complement the ALS in the hard x-ray region, thereby, providing unparalleled photon brightness over this extended portion of the electromagnetic spectrum. The new beam line at PEP will require an access tunnel and an underground bore for the beam line.

National Synchrotron Light Source (NSLS)

The second construction project will expand the capabilities at NSLS by allowing new beam lines to be built and by enlarging the existing building for the purpose of permitting additional experiments to be conducted. The proposed building expansion will be a structure extending to the northern perimeter of the existing building and add an additional floor above the office section. Construction of additional beam lines, including insertion devices, will be undertaken to accommodate the heavy use and demand by outside users from industry, universities, and other laboratories.

Further details on each of these projects are provided in the construction project data sheets for Project 84-ER-111 and 84-ER-112.

	FY 1984 Request
B. Research Associated with Construction..................................	$ 5,100

Operating funds are needed for research and development to achieve the design goals of the construction projects proposed as part of this new initiative. In particular, as part of the NCAM project research is needed in two specific areas, the Advanced Light Source (ALS) and the Stanford Synchrotron Radiation Laboratory (SSRL), and research funds are also requested for support of the National Synchrotron Light Source.

The ALS consists of a 50 MeV linear accelerator, a 1.3 GeV "booster" synchrotron, a 1.3 GeV electron storage ring, and associated photon beamlines. The photon beam lines will not originate from the ring's beam bending magnets. Instead the ALS will have 12 straight sections in which special magnetic devices, wigglers and undulators, will be inserted to produce high fluxes of photons at energies ranging up to 5000 eV. A users's workshop will be held to identify projected future experimental requirements. Development of an optical ray tracing program will provide a tool to characterize the performance of these lines. R&D will be required to develop new beam lines concepts and materials for the associated mirror and grating systems. Additional R&D is needed on the fast kicker magnets and the power supplies, electron beam instabilities, and conceptual design of technical components.

At the Stanford Synchrotron Radiation Laboratory research funds are requested for soil tests and conceptual design refinements as required prior to inception of detailed design. Advanced engineering work must also be done to refine conceptual designs of components for this new beam line.

Related to the NSLS expansion, operating funds are requested to conduct research and development necessary for the construction of new beam lines. It is important to conduct research on advanced wiggler and undulators which will be inserted in x-ray and VUV rings. In addition, R&D will be performed on advanced mirrors and gratings for the x-ray microscopy and x-ray spectroscopy lines.

	FY 1984 Request
C. Forefront Research Program...	$ 4,500

Programmatic research related to the Advanced Materials Synthesis Laboratory (AMSL) will build on very strong ongoing programs in materials science at LBL. These programs, like others nationally, are handicapped by unavailability of novel and well-characterized materials for study. A particular objective of AMSL will be to create a forefront facility (for the synthesis and characterization of materials of novel or optimized physical or chemical properties); materials which may make possible devices, engines, or structures of superior performance in high technology and energy-related industries. Investigators in AMSL will collaborate with investigators in the Surface Science and Catalysis Laboratory (SSCL) by synthesizing and characterizing zeolites and novel new catalysts for investigation in SSCL. They also will collaborate with scientists and design engineers of the Advanced Device Concepts Laboratory (ADCL) by synthesizing new materials and materials of improved, controlled doping, which may make possible new device or engine concepts. For example, areas in this latter category include new superconducting-metal combinations for applications in high-temperature SQUIDS (superconducting quantum interference devices) and high-performance ceramics for use in novel design concepts that make possible the use of reliable energy efficient engine components from brittle materials.

In the metals area, research in the AMSL will emphasize synthesis of novel and new alloys. Initial work will address substitution for the strategic/critical elements of chromium and cobalt used in structural alloys such as steels. The LBL expertise on alloy design and electron microscopy will be brought to bear on designing new steels with higher strength and corrosion/wear resistance for fossil fuel-, nuclear-, and automobile-related applications. The fundamental research will be coupled with the advanced fabrication facility for processing new alloys under controlled yet industrially-relevant conditions. New materials will be evaluated primarily for physical properties needed for state-of-the-art sensors for devices, superconductors, and catalysts, among others. The resident capabilities for characterization of new materials synthesized, by electron microscopy as well as intense photons, will be a unique feature of the NCAM.

The surface modification areas will be directed towards synthesis of new materials and novel structures, exploiting the NCAM facilities for ion/laser processing and molecular beam and liquid phase epitaxy. There will be several interdisciplinary thrusts in this task: wear-hardened surface regions will be produced by both structural and chemical modification, and the deformations and fracture modes will be evaluated under difference abrasion and erosion conditions.

In the ceramics area, studies on the preparation and characterization of fine powders will be concerned with new catalyst materials such as zeolites (which are a class of compounds with porous structure), structural materials such as ZrO_2, Si_3N_4, and SiC, and complex oxide dielectrics. These sub-micron powders will be characterized in terms of their micro and surface chemistry, surface crystallographic orientation, bonding, surface area, and packing and compacting behaviors. This characterization will take advantage of the co-sited synchrotron facilities and expertise on surface characterization and behavior. Powder compaction studies will be interfaced with the related efforts and expertise on high pressure technology.

Semiconductor materials of controlled ultra-high purity and extreme crystallographic perfection will be prepared and characterized. These will include new ternary and quaternary components of the III-V and II-VI groups with controlled impurities for optimum electronic performance. These materials and their surfaces and interfaces will comprise various advanced solid-state devices. Some of them will be based on wide band-gap high temperature semiconductors, e.g., SiC, and thus supportive of the new technologies for which they are attractive.

Research related to the Surface Science and Catalysis Laboratory (SSCL), will be undertaken to further the fundamental understanding of surfaces of materials with a view toward applications and catalyzed processes on solid surfaces. The FY 1984 effort will include programs on: atomic rearrangement on surfaces, surface properties under extreme conditions and on new zeolites and novel catalyst characterization.

A theoretical and experimental effort will be initiated in FY 1984 to use techniques already developed at LBL for characterizing atomic surface structures. Theoretical predictions will be based on the pseudopotential model and related approaches, which have been perfected at LBL recently, while experiments will be performed using advanced (digital) LEED, HEED, surface EXAFS, and photoelectron diffraction. The program will later become oriented toward materials of interest for new device concepts (ADCL). Thus emphasis will shift from clean surfaces to overlayer systems (adsorbates, Schottky barriers) to atomic interfaces and three-dimensional structures. Irradiation surface structures will be altered with high-energy particles or intense photon fluxes which introduce line defects and point defects, and cause evaporation and phase transformations, including melting. Zeolites and other novel non-metallic catalysts will be synthesized and characterized using synchrotron radiation, initially at SSRL and later at ALS.

Research related to the Advanced Devices Concepts Laboratory (ADCL) will utilize the soft x-ray lithography capabilities of the Advanced Light Source (ALS) to develop new experimental devices with dimensions of 100°A or less. Success here would have an enormous effect on all electronic technology, perhaps most importantly on greatly advanced computers. The research will exploit exceptional properties of new materials in device concepts that have the potential for dramatic improvements--orders of magnitude increases in limits of sensitivities of sensors, for example, and the ADCL will investigate device concepts with potential for yielding order of magnitude improvements in characterizing material properties and behavior.

X-ray lithography success in photolithography and related studies will have an enormous effect on the understanding of the internal structure of microscopic biological systems such as cells. Research will be pursued in three dimensional solid state devices. The development of the existing two-dimensional technology in electronic circuits has led to the integration of up to one million sensing, amplifying, and switching elements on a single substrate. Three dimensional integrated circuits will have faster and more powerful operating procedures--some first ideas have already been generated. Fabrication of these novel devices will probably require molecular beam epitaxy, (MBE), deep ion implantation, capabilities within the AMSL together with x-ray lithography.

In the area of X-ray microscopy development, the increased soft x-ray intensity of the ALS should permit the imaging of living cells at times sufficiently short that resolution is preserved. The high intensity will also make possible the discrimination of low-Z elements such as carbon and phosphorous. This is of great importance to furthering our understanding of biological processes and structures, presently outside the capability of instruments using electron beams. A further development which would greatly facilitate the application of SQUIDs to a wide variety of measurements (e.g., geophysics, underwater detection, and medicine) is the design and fabrication of high temperature SQUIDs. In the area of high temperature SQUIDs, the sensitivity of DC Superconducting Quantum Interference Devices (SQUIDs) is directly limited by their size. The lithography program at ADCL will directly aid the development of more sensitive SQUIDs. Another area for research includes devices for photon generation and detection. The extraordinary brightness and time structure of ALS will require the development of novel ultrafast devices for the direct detection of a large variety of signals produced in ALS experiments. Development of novel device concepts as well as actual devices to solve these detection problems will be initiated.

For FY 1984, the equipment needed to construct ALS on schedule includes the following: Survey and alignment apparatus for tolerances of a fraction of a millimeter, equipment for ultra-high vacuum (UHV) for materials testing, RF development instrumentation in the two ranges 500 MHz and 2880 MHz, pulsed magnet equipment capable of 50 nanosecond rise times and low duty factor, low level electronics for beam monitoring, and control system equipment for hardware and software aids. Equipment for programmatic research includes advanced instrumentation for new material synthesis and characterization, e.g., a molecular beam epitaxy (MBE) system, ion-implanation and laser process instruments, and liquid phase epitaxial growth equipment. All of this instrumentation is for the advanced material synthesis in both solid and thin film form as well as for surface modification and coatings.

	FY 1982	FY 1983	FY 1984 Request
Chemical Sciences			
Operating Expenses	$ 63,187	$ 70,000	$ 75,500
Capital Equipment	4,940	5,510	6,520
Construction	0	400	450
Subtotal	$ 68,127	$ 75,910	$ 82,470

The Chemical Sciences subprogram supports basic research in physical, organic, inorganic, analytical and biochemistry; chemical engineering; chemical physics and atomic physics. Emphasis is currently placed on photochemistry, radiation chemistry, separations, coal chemistry, catalysis and combustion. The research is conducted primarily in national laboratories and in universities.

The principal objective of the Chemical Sciences subprogram is to expand our knowledge in the chemical and related sciences in those areas most likely to lead to new ideas and improved processes for the development and use of domestic energy resources. It is also an objective to make available to the nation highly qualified researchers with the diverse chemical insights needed to address the array of complex problems as they are encountered in the new and developing energy technologies.

Insight into the complex surface chemistry of catalysts and how it affects their activity and selectivity, for example, is needed to guide the development of new catalysts which will not be dependent on scarce or strategic materials. High quality reference grade coal and material samples, and research related to their chemical stability, are needed by the scientific community to assure comparability of results of chemical and physical measurements on them.

The scientific basis for the possible photochemical conversion of solar energy to either fuel or electricity, while promising, needs further basic research if we are to approach the state where technological development can begin. Thermodynamic data and understanding of pure constituents of gases and liquids and their effect on the properties of fluid mixtures are essential to design of economic processes. Because of the magnitude of such a measurement problem, new correlations, models and theory for predicting mixtures are particularly needed. Further understanding of combustion is expected to lead to more efficient, safer, cleaner use of fossil fuels. In the fusion program not enough is known about the physics of highly stripped ions and their interactions with plasmas.

Recent advances in the surface sciences and organometallic chemistry, and specialized facilities such as the National Synchrotron Light Source and the Stanford Synchrotron Radiation Laboratory, have opened up opportunities for synergistic advances in important energy related areas of catalysis. A like synergism is occurring in combustion science, with the Combustion Research Facility and its state-of-the-art laser diagnostics interacting in a user oriented mode with university, industrial and other national laboratory researchers.

Among the accomplishments attained in the Chemical Sciences subprogram in the past year, and reported here as examples, are several involving better understanding of catalysis, one related to nuclear waste isolation, and one involving a step forward in the fundamental understanding of phenomena important in direct conversion.

- A promising route for direct gasification of carbon to methane has been discovered. Based on alkali metal catalysis of the reaction of graphite with water vapor, it is very attractive compared to present coal gasification technology because it requires only one step instead of two and it proceeds at considerably lower temperatures. (Project jointly supported by BES and Fossil Energy).
- Clusters have been generated containing hundreds to thousands of molecules such as hydrogen and bearing an electric charge. Acceleration of such clusters and subsequent collision may lead to the conditions required for nuclear fusion. (This work was jointly supported by Chemical Sciences and Advanced Energy Projects).

- A phenomenon called "hot carrier effects", long known in semiconductor solids, was theoretically predicted (and disputed) as a solid-to-liquid phenomenon. Now this has been experimentally observed, and conceivably it could lead to a doubling in the efficiency of direct conversion photoelectrochemical solar devices. Hot carriers are electrons or positive charges, excited by light in semiconductors, which can carry excess energy into a chemical system.

- A three order of magnitude improvement has been achieved recently in the precision of measurement of the ratio, of the sulfur-32 isotope to sulfur-34 in air. It was done by the new technique of negative ion mass spectrometry. The greatly improved precision is critical to establishing the extent of anthropogenic sulfur in acid rain, which is in turn, of importance to ascribing the source of the pollution.

- A major advance in atomic physics has opened up an entirely new area of study; quasi-molecular x-ray spectroscopy. Highly energetic atomic ions are first slowed, and then collide with target atoms. At the moment of collision, x-rays are produced that can be associated with neither projectile nor target species but with a short-lived "molecule" of the two. Spectroscopy of these will add to our understanding of processes important in fusion.

- Chemical studies have led to (1) long sought-for activation of carbon-hydrogen bonds in saturated hydrocarbons, brought about by insertion of a transition metal atom between the carbon-hydrogen pair of atoms and (2) selective oxygen atom transfer to unsaturated hydrocarbons. The former may be important to activating organic groupings in coal for conversion while the latter suggests more energy efficient processes for making important chemical intermediates.

- Molecular beam experiments, supported by theoretical calculations, indicate that the reaction of oxygen atoms with unsaturated hydrocarbons leads preferentially to the formation of reactive species in which the oxygen atom has taken the place of another group in the molecule. Contrary to previous belief, carbon-carbon bond breaking does not occur. This observation will affect our perceptions of combustion chemistry.

The FY 1984 operating fund request of $75,500,000, will maintain many ongoing projects. After allowance for inflation ($3,850,000), the remainder of the increase ($1,650,000) will be used for expansion at new facilities and to strengthen basic studies in coal science with a set of premium coal samples which is essential for comparative research and analysis. The strengthening of new facilities includes the expanded operation of NSLS and the initiation there of new photochemistry, atomic and chemical physics activities; installing an LBL beam line at SSRL; and CRF operation expansion to accommodate stronger user activity. Research will continue in the following areas: catalysis, photoelectrochemistry and photocatalysis research; combustion related chemical physics; coal chemistry, and fission product chemistry research related to nuclear waste isolation.

The request for capital equipment is needed for replacement of worn out equipment and to obtain new, state-of-the-art equipment which is critical to advancing into forefront areas of science. The request also includes equipping NSLS as this unique facility comes to fuller potential and obtaining equipment needed for a new LBL beam line at SSRL in order to combine LBL's talents with SSRL's.

The construction request of $450,000 is for two accelerator improvement projects and one GPP project. The accelerator improvement projects are at ANL's Dynamitron ($100,000) in order to achieve the capabilities needed for the advanced molecular ion research there which has recently received national recognition, and at ORNL's EN Tandem ($250,000) in order to bring this former nuclear physics accelerator up to the more demanding performance requirements of atomic physics. A $100,000 GPP project at the Combustion Research Facility will strengthen its effectiveness as a user oriented laboratory and its safety.

	FY 1982	FY 1983	FY 1984 Request
Nuclear Sciences			
Operating Expenses	$ 22,407	$ 30,644	$ 37,900
Capital Equipment	860	1,556	2,150
Construction	0	0	270
Subtotal	$ 23,267	$ 32,200	$ 40,320

Objectives of the Nuclear Sciences subprogram are: (1) measurement, compilation, and evaluation of nuclear data for fission and fusion energy technologies; (2) improvement of our knowledge of the chemical and physical properties of the actinide elements; (3) assurance of the availability for research of both isotopically enriched samples of the ordinary elements and samples of the man-made transplutonium elements, (4) operation of the Stanford Synchrotron Radiation Laboratory (SSRL), which shares use of the Stanford Positron Electron Asymmetric Ring (SPEAR) with the High Energy Physics program. Responsibility for operation of the SSRL was transferred from the National Science Foundation to BES in FY 1983; and 5) research on heavy ion accelerator technology and preparation for its evalaution as a driver for inertial confinement fusion applications. The FY 1984 operating funds request for Nuclear Science is $38,150,000, while the capital equipment request is $1,900,000. The different activities within Nuclear Sciences are detailed below, but it should be mentioned here that the increase for capital equipment stems from (a) overdue refurbishing of the Manhattan Project-Vintage Calutrons and (b) a different mechanism for handling SSRL equipment funding following its interagency transfer.

Nuclear Data

The fission and fusion energy technologies require nuclear data for optimization of reactor design, analysis of operations and safety of reactor systems, and management of spent fuel materials. The Nuclear Data activity provides a long range base of data in support of these technologies. Nuclear data needs are documented in great detail and regularly updated: for the fission technology, through the work of the Cross Section Evaluation Working Group of the National Nuclear Data Center (NNDC) which is supported jointly by this subprogram and the energy activities Reactor Research and Technology Division; for the fusion technology, by means of a working group of the U.S. Nuclear Data Committee and direct input from the energy activities Office of Fusion Energy.

The principal element of the nuclear data measurement effort is the operation of the world-class Oak Ridge Electron Linear Accelerator (ORELA) for the measurement of neutron cross sections over a wide range of energies. Several small university groups collaborate with Oak Ridge National Laboratory staff in these measurements at ORELA. Measurement efforts are also conducted in on-campus accelerator laboratories at Duke University, Lowell University, and Ohio University. Efforts exploiting special facilities are carried out at several other national laboratories and at the National Bureau of Standards (NBS). Work devoted to the improvement of neutron standard cross sections is supported at the NBS, University of Michigan, University of New Mexico, and Idaho National Engineering Laboratory.

The compilation and evaluation effort is concerned with establishment of a data base for neutron-induced nuclear reactions and also with the maintenance of the Evaluated Nuclear Structure Data File (ENSDF) which encompasses all the information produced world-wide on the level structure and decay properties of nuclei. It is important to keep the data bases and evaluations up-to-date because of their extensive use by scientists and engineers working in the energy technologies.

Steady progress has been made in providing nuclear data of high priority to the Office of Fusion Energy since a coordinated effort was initiated in 1975. Measurements at Duke University, Ohio University, ORNL and LANL have contributed needed neutron elastic and inelastic scattering cross sections below 15 MeV. The fusion 14 MeV neutron source at LLNL has been used by Livermore staff for detailed measurements of charged-particle production using a specially designed spectrometer system. Absolute measurements of helium gas production have also been made at LLNL by a group from Rockwell International.

In FY 1984, measurement, compilation, and evaluation of data of importance to the fission reactor technologies will remain a major thrust of the nuclear data activity work and will include the development of better neutron cross section standards, as well as measurements to meet the backlog of requests for higher accuracy data for selected actinides and structural materials. However, highest priority will be given to the higher energy cross sections needed for fusion reactor designs - such as those used in calculations of tritium breeding in blankets and for radiation damage in structural materials.

The FY 1984 request for operating expenses for the Nuclear Data activity is $9,430,000, $630,000 greater than FY 1983. A strong nuclear data measurement program will be maintained. ORELA will be operated at FY 1983 levels of utilization. An increase in university participation in the data compilation effort will be implemented. Publication of the first Radioactivity Handbook based on the ENSDF data base will be achieved in FY 1984. The request for capital equipment is $380,000. It will provide for necessary replacement and upgrading of equipment, primarily at the ORELA facility.

Heavy Element Chemistry

As pointed out in the energy activities Technology Base Assessment and from workshops on environmental research of the transuranium elements, the Governmental nuclear energy and technology programs need specific information and data on the behavior of actinides in fuel processing streams, in nuclear waste hosts materials and in the environment. Heavy Element Chemistry research helps meet their needs as well as contributing to an understanding of the fundamental chemical and physical properties and behavior of matter.

Advantage is being taken of the development of spent nuclear fuel repositories which provide an opportunity to study actinide chemistry in near neutral and alkaline aqueous media as well as the interaction of actinide ions with natural sorbents and complexing species. These high priority studies provide valuable information on the behavior of actinides in the environment and for making important decisions regarding the treatment of spent fuel.

Research groups at national laboratories and universities are supported to pursue heavy element and radiochemical investigations. The study of actinide chemistry is largely limited to the national laboratories since high levels of radioactivity are involved, while some tracer work is done at universities. These laboratory facilities provide opportunities for visiting scientists from university and foreign laboratories to pursue collaborative research with the U. S. investigators. The HFIR and TRU facilities at ORNL provide for the irradiation and chemical processing of targets to produce research quantities of the transplutonium elements for chemistry and nuclear physics research by scientists in energy activity programs.

Among the more notable accomplishments in the Heavy Element Chemistry area during the past year are the following examples.

- The leaching of plutonium from candidate glass hosts for spent nuclear fuel was found to depend strongly on chemically active leachants generated in water surroundings by the high radiation field. This aspect of the effect of radiation on the glass host/water leachant system was not known heretofore.

- A comprehensive picture of the chemistry of plutonium species and certain other actinides in environmentally important aqueous carbonate-bicarbonate media has been developed. This information expands our understanding of the chemical behavior of these species as it pertains to spent nuclear fuel management.

- Studies of the binding of actinides to naturally occurring humic materials--certain organic portions of soils -- indicate that the migration of plutonium through soils rich in these materials would be very slow. Certain forms of these actinide nuclear wastes become strongly bound to the complex organic species and are essentially kinetically inert.

- The first detection of fluorescence emission from electronically excited PuF_6 has been achieved. This directly impacts the development of methods for the laser-based separation of plutonium isotopes.

Stable and Special Isotope Production

The electromagnetic isotope separators (Calutrons) provide isotopically enriched research materials for sale and loan on an international basis. These materials are used for a wide variety of medical, industrial, and research applications. The Calutrons are of Manhattan Project vintage and much of the equipment is wearing out. Thus in FY 1984 it will be imperative to provide equipment funds if they are to continue operating. Over a five year period, $250,000 per year will be needed for this purpose.

The FY 1984 operating funds request for Heavy Element Chemistry and Stable and Special Isotope Production is $16,930,000, $1,430,000 greater than FY 1983. Reflected within this request is the need to maintain a constant level of operations at the HFIR and TRU facilities and to meet the projected HFIR fuel inventory increase. The HFIR fuel inventory requirements for FY 1984 are modest but the FY 1985 requirements are expected to be about $1,900,000. Also reflected is an expansion in the study of the fundamental chemical properties of the actinides under environmental conditions. Replenishing of the stable isotope samples in the Research Materials Collection would continue at the FY 1983 level. Within the capital equipment request the increase in funds will be allocated to the Electromagnetic Isotope Separation (Calutron) Facility at ORNL to replace wornout and obsolete equipment and upgrade outdated production facilities.

In the same framework, $270,000 is needed for construction of a new and increased capacity cooling tower for the Calutrons. The tower will provide secondary water cooling for the primary closed loop oil filled system which is integral to the large magnetyokes. The replacement tower is needed not only to replace the present old and worn out one but also in anticipation of expanded production of stable isotopes to meet national needs in research and in the sales program for medicine and industry.

Stanford Synchrotron Radiation Laboratory (SSRL)

Responsibility for operation of the SSRL was transferred from the National Science Foundation to BES in FY 1983.

The SSRL was expanded under the auspices of the NSF in partial response to a National Academy of Sciences report which pointed out the great potential for research in the newly identified area of synchrotron radiation. Intense radiation in the vacuum ultraviolet and x-ray wavelength regions is given off by the circulating high energy electrons used in high energy physics research. SSRL shares equally,. with the High Energy Physics program, the time and costs of operating the Stanford Positron-Electron Asymmetric Ring (SPEAR). Presently, SSRL is heavily oversubscribed by the solid state, chemical and biomedical research communities for use of its high intensity photons.

The request for SSRL operating expenses of $6,790,000 will maintain the FY 1983 level of operation of SSRL and its use by the scientific community. The capital equipment request opens new utilization possibilities, and provides for advanced dispersion devices and detectors with characteristics suited to SSRL's unique pulse time structure.

Heavy Ion Fusion Research (HIF)

The goal of the Heavy Ion Fusion Research program is to develop heavy ion accelerator technology and perform appropriate ion-beam experiments to the point where an adequate data base exists for evaluation of heavy ion inertial fusion drivers, and their possible use in civilian power applications of inertial confinement fusion.

The Heavy Ion Fusion Research program is a new program under the aegis of the energy activities Office of Energy Research, having been previously supported by the Office of Inertial Fusion (OIF) within Defense Programs. This is in accordance with Conference Report 97-342 dated November 18, 1981, on the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1982, H. R. 3413 (the Authorization Act for DOE national security programs for FY 1982), which prohibits the use of funds authorized for the defense inertial confinement fusion program for "... the research, development, or demonstration of the use of heavy ion devices...." In accordance with this Congressional guidance, the Assistant Secretary for Defense Programs and the Director of Energy Research have agreed that the "Heavy Ion Fusion Research" programs will be budgeted for in FY 1984 by the Office of Energy Research in the Energy Supply Appropriation.

Although the HIF Research program relies heavily on the theoretical and experimental groundwork developed since 1977, it is a "new initiative" in the sense that funding is sought directly for energy applications. The past accomplishments and the promise of the heavy ion accelerator approach for fusion power have been the subject of many extensive technical reviews. These have been uniformly favorable in their evaluations. However, despite the accomplishments, a number of important questions remain. A balanced program to answer these questions includes three program elements: Accelerator development and design, beam transport and focusing, and beam-target interaction. The three elements are interactive and interdependent on each other and cannot exist separately. Target design studies will continue under the auspices of OIF/DOE at the weapons laboratories. The HIF program will support accelerator and systems research which will parallel the target physics program continuing under OIF support.

Despite past accomplishments, a number of important questions remain to be answered if this idea is to be useful as the basis of an energy technology. A balanced program to answer these questions must include additional work in three program elements: Accelerator development and design, beam transport and focusing, and beam-target interaction.

A two-stage plan is envisioned. The first stage (FY 1984-1986) primarily entails the research and development of critical elements of promising accelerator technologies with particular attention to cost reduction. The second stage calls for a high-temperature experiment in which a high temperature (50-100 eV) solid-density plasma would be created. Planned for FY 1987-1989, the second stage experiment would entail the construction of an accelerator for the High Temperature Experiment (HTE). Production of high temperature in a solid-density plasma would represent a truly significant entry of accelerator technology into the parameter range needed for inertially confined fusion. It would also settle questions relating to energy deposition and beam propagation, besides providing a crucial benchmark in the development of accelerators for fusion power. Given the long-established accelerator technology history that can guarantee repetition-rate, efficiency, and reliability, HIF could then be reliably evaluated as a serious candidate for a fusion-power system for the next century.

In preparation for the high-temperature experiment, a wide range of parametric dependences need exploration before an optimum choice accelerator design can be made. In addition, it is crucial to have certain data from experimental tests on transport, acceleration, and the selected method for current amplification. Issues to be addressed in Stage I include: predicted transfer space-charge limits on beam current; stability, reproducibility, and reliability of intrapulse and pulse-to-pulse operation; accelerator cost reduction; preservation of six-dimensional phase space including stability and containment of the high charge density pulse; and final compression, transport, and focusing of the beam to the target.

The FY 1984 operating expenses request for the Heavy Ion Fusion Research program is $4,750,000 and the capital equipment is $250,000. The program represents a new initiative under the aegis of the energy activities Office of Energy Research to develop heavy ion accelerator technology that will lead toward civilian power applications of inertial confinement fusion. The Los Alamos National Laboratory will continue to serve as the lead laboratory in the Heavy Ion Fusion Research program. The principal experimental work in accelerator development and design will be located at the Lawrence Berkeley Laboratory.

	FY 1982	FY 1983	FY 1984 Request
Engineering, Mathematical and Geosciences			
Operating Expenses	$ 24,864	$ 31,050	$ 33,670
Capital Equipment	1,900	1,920	2,120
Subtotal	$ 26,764	$ 32,970	$ 35,790

This subprogram provides for the agency's principal long-term, fundamental research efforts in the disciplines of mechanical engineering, electrical engineering, applied mathematics, computer sciences, geology, geophysics and geochemistry.

Increases are requested for specific topics within these disciplines chosen for their long-term importance to meeting our nation's energy needs. In Engineering Research additional effort is required in obtaining engineering data needed for decisions on future energy technologies. In Applied Mathematical Sciences, the request provides for strengthening of research on high performance computing systems as a key element in U.S. efforts to maintain leadership in the intensely competitive area of supercomputer development. In Geosciences, the requested increase is required to augment the efforts relevant to nuclear waste isolation, and the efforts in organic geochemistry and advanced geophysical techniques.

In addition to the request for operating funds presented in the next several paragraphs, funds are requested for capital equipment including, for example, equipment for holographic measurement of flow in heat exchangers, parallel processors for research computing facilities, and detector arrays for seismic experiments. The requested funding for equipment is vital for effective research in these areas.

Engineering Research

The objectives of Engineering Research are 1) to extend the body of knowledge underlying current engineering practice in order to open new ways for enhancing energy savings and production, prolonging useful equipment life, and reducing costs while maintaining output and performance quality; and 2) to broaden the technical and conceptual base for solving future engineering problems in the energy technologies.

All the energy technologies benefit from fundamental advances in the areas emphasized in Engineering Research. Thus, for example, improved understanding of heat transfer, fluidized beds, and solid mechanics can be as pertinent to Solar or Conservation as to Fossil Energy or Nuclear Energy technologies. The same holds for basic discoveries in process control and instrumentation. Various engineering data are vital for the design of economical, reliable, and safe energy systems across the board. Such advances are the essential ingredients necessary to insure flexibility in meeting the Nation's future energy needs.

Generic energy related engineering research is filled with opportunities for significant advances. This activity seeks solutions to a broad class of fundamental energy related engineering problems in the areas of 1) Mechanical Sciences - including tribology, heat transfer, fluidized beds, and solid mechanics; 2) System Sciences - including process control, and instrumentation; and 3) Engineering Data and Analysis - including nonlinear dynamics and data bases for energy engineering systems.

Recent accomplishments in Engineering Research include:

- An advance in control system theory: Yield in some chemical processes is limited by safety considerations imposed by operating temperature and pressure limits. In a significant advance of control systems theory it has been demonstrated how the yield of catalytic reactors can be increased several fold without compromising the safety of the process plant. This accomplishment shows that vibrational control theory applies to a wider range of chemical reactors than previously expected.

- Determination of the mechanism for spread of oil spills on water: Oil spills are a well-known, extremely serious threat to the environment. Once an oil-spill occurs this threat can be mitigated only by containment and eventual cleanup. The recent determination of the details of the mechanism for spread of oil spills on water has provided understanding essential for improving spill containment methods and clues to better cleanup procedures.

- A perennial problem for the determination of fitness for service and operating safety of energy-related structures is an early detection of internal cracks. In an important achievement in the field of instrumentation needed for this purpose, a method was developed this year which allows a rapid detection of internal cracks as small as two thousandths of an inch. The method yields information about the location, size and orientation of a crack, which is needed to assess the influence of the detected minute crack on the remaining safe and useful life of the structure.

In FY 1984, $6,350,000 in operating funds, an increase of $1,000,000, are requested for Engineering Research. These funds will provide for sustaining the ongoing efforts in the three focal areas of Engineering Research, for extending work in non-linear systems dynamics emphasizing the impact of recent advances in applied mathematics on energy engineering practice; and for addressing the problem of scale up of process plants involving multiphase flows. A small, but significant, part of the funds will be used to pursue additional effort in the acquisition of engineering data needed to meet the requirements of future energy technologies, especially the thermophysical properties of fluids and the prediction of their behavior in large scale systems.

Applied Mathematical Sciences

The objective of the Applied Mathematical Sciences (AMS) research program is to advance the understanding of the fundamental concepts of mathematics, statistics, and computer science underlying the complex mathematical models of the key physical processes in energy systems. The AMS program funds basic research at many of the national laboratories, universities and private research institutions in three major categories: analytical and numerical methods, information analysis techniques, and advanced computing concepts. Special studies conducted by members of the National Academy of Sciences at DOE's request help identify new thrusts and program priorities.

Much of the scientific research and development effort supported by BES is focused directly on analytical and numerical modeling of physical processes. Without an understanding of the fundamental principles upon which these models are based there is no possibility of making any significant progress in developing energy systems for the future. The results of analysis, algorithm development, and development of computational techniques are crucial to the conduct of scientific research.

Recent AMS accomplishments include the following:

- A result of great power and importance has emerged from research at Los Alamos on the mathematical theory of dynamical systems. Many systems such as ones involving convective flow become chaotic under some circumstances. The laminar flow becomes turbulent. The new result shows that for a wide variety of systems, the onset of chaotic phenomena follows a precise law independent of the size, boundaries or other details of the system. Hence observation of simple systems can be used to model systems which in the past seemed overwhelmingly complex. Further, the new result can be applied not only to turbulent flow but also, for example, to chemical oscillators and Josephson junction devices.

- New ways have been found to apply the mathematical description of the phenomena called bifurcation--the transition of a system from one stable state to two other, coexistent states with differing properties--to a model explaining recent observations on the several modes of burning of solid fuels.

- In a project called AURORA (Automated Reasoning on Reactor Analysis), a collaboration between Argonne and Northern Illinois University, the automated reasoning program was able to prove, as required for nuclear plant licensing, that single component failures could not inhibit shutdown.

The FY 1984 operating budget request for Applied Mathematical Sciences is $14,670,000, an increase of $820,000 over the amount requested in FY 1983. The research will remain focused on the concepts underlying large-scale computational modeling of processes in energy systems. There will be a continued emphasis on the support of the algorithm, language, and architecture aspects of high performance parallel computing systems for scientific computation. This will support a coordinated effort by the best research teams capable of maintaining U.S. leadership in supercomputers, an area of intense international competition. Some additional support for analysis of the mathematics of non-linear systems will be possible. Support for computational mathematics and statistics will be continued at present levels.

Geosciences

The Geosciences activity supports long range research in geology, geophysics, geochemistry, rock mechanics and tectonophysics to develop, in areas pertinent to the nation's energy needs, a quantitative and predictive understanding of processes in the earth and the solar terrestrial interface.

As the traditional sources of energy supply diminish, alternatives must be found. Further, the extraction and use of energy resources result in wastes, the safe disposal of which requires continued fundamental research. The earth and the sun are the sources of the world's energy supply. The earth and its atmosphere are the sinks for the wastes generated. Thus, the development of an adequate base of knowledge in the geosciences is critically needed for energy resource recognition, evaluation and utilization in an environmentally acceptable manner.

Several new directions in which this base of knowledge should be extended have become evident. A workshop in organic geochemistry identified a number of priority research areas of high scientific and programmatic interest. Seismic activity, tectonic uplift and increased fumarolic activity at Long Valley-Mono Craters has opened a second area for detailed site study in the Continental Scientific Drilling Program (CSDP). The need for *in situ* geophysical and geochemical information has increased the need for research in advanced geophysical techniques.

Geosciences supported research is carried out principally at the national laboratories and at universities. The program supports long range disciplinary research chosen for its special significance to present and future energy technologies. For example, coordinated projects in nuclear waste isolation and Continental Scientific Drilling address directly and indirectly long range national energy concerns. Studies of subsiding basins, their time, temperature and tectonic history are leading to a better understanding of the development of energy resources in nature and thus to their more effective exploitation. Development of new geophysical methods and of computer codes for improved modeling of geophysical data and their use in resource exploration are leading to improved methods of locating resources and identifying sites for waste isolation. Geochemical studies of element migration and energy and mass transfer is providing the knowledge base needed to understand the mechanisms of energy and mass transfer in hydrothermal systems, the movement of radio-nuclides from a repository, and the concentration and location of resources. Research in organic geochemistry is yielding an improved understanding of the origin, development and emplacement of gas, oil, and coal deposits, to identify the sources of pollutants in these resources and may suggest ways of dealing with them.

Recent Geosciences accomplishments include the following:

- Computer modeling studies at Sandia National Laboratories indicate that water-biomass mixtures can be efficiently converted to higher quality gaseous fuels by the very high temperature heat derived from magma bodies.
- Research at the Argonne National Laboratory has shown that Columbia River basalts have a pronounced reducing effect on neptunium in the hexavalent state. The reduced states are highly adsorbed on the surface of the basalt, a favorable factor for the immobilization of nuclear waste in deep repositories in basalt.
- Studies at the Lawrence Livermore National Laboratory have shown that the electrical conductivity of oil shale during retorting is a billion times greater than its value before or after retorting. Because highly conductive material inside insulators can readily be detected with radio waves, the retorting zone of an underground body of oil shale may be mapped remotely.

The request for FY 1984 operating expenses of $12,650,000, an increase of $800,000 over FY 1983, for the Geosciences program provides for continuation of the research efforts in Geology, Geophysics and Earth Dynamics, in Geochemistry, in Energy Resource Recognition, Evaluation and Utilization, in Hydrologic and Marine Sciences and in Solar-Terrestrial Atmospheric Interactions with emphasis on continential structure and dynamics (Continental Scientific Drilling Program), on long-range, basic studies pertaining to the isolation of nuclear wastes and on organic geochemistry.

	FY 1982	FY 1983	FY 1984 Request
Advanced Energy Projects			
Operating Expenses	$ 7,310	$ 8,300	$ 9,100
Capital Equipment	320	290	310
Subtotal	$ 7,630	$ 8,590	$ 9,410

The objective of the Advanced Energy Projects subprogram is to explore the feasibility of novel, energy-related concepts, as they evolve from basic research. Such concepts are at an early stage of scientific definition and therefore would not qualify for support by technology programs. Because they are new and untried, those concepts invariably represent a high risk; to qualify for support they must also have the potential for an eventual high pay-off. Also supported is exploratory research on concepts that do not fit easily into the existing energy activities program structure. An area of major programmatic attention is the transfer of successful projects to appropriate technology programs or to the private sector; one or two such transfers now are effected every year.

The need to support exploratory research on novel concepts of the type described above is to provide the seed for technical innovation. However, such research does not generally qualify as basic research, where the objective is to gain knowledge and understanding of processes and phenomena in nature. Neither does it qualify as technology-related: the link with any specific technology needs yet to be established. Hence, the Advanced Energy Projects subprogram fills a very real void between basic and technology-related research.

The subprogram takes advantage of opportunities resulting from advancements in basic science. Thus, for example, advancements in the physics of ionic conductors--ceramic materials that conduct ions but not electrons--have lead to an altogether new and potentially advantageous scheme for directly converting heat to electricity; that scheme was recently demonstrated on a laboratory scale in a device called a sodium heat engine. The Advanced Energy Projects subprogram supports several projects in the area of innovative approaches to direct heat-to-electricity conversion.

The mode of operation for this interdisciplinary, and still relatively new, subprogram is to support individual projects for a limited time only; it differs from other subprograms in that it does not fund ongoing evolutionary research. The spectrum of projects supported is very broad, encompassing, for example, new approaches to uranium separation, totally new approaches to controlled fusion, new methods of oil recovery from shale, and new approaches to solar energy collection and concentration, just to name a few. Close contact is maintained with DOE technology programs to ensure proper coordination. Projects are selected on the basis of unsolicited proposals received from researchers at universities, industrial laboratories (especially small R&D companies) and national laboratories. At present, about forty projects are being supported, which allows a turnover rate of about thirteen projects a year.

A recent accomplishment of Advanced Energy Projects is the demonstration of scientific feasibility of batteries, both storage and primary, with electrodes made of light polyacetylene sheets (rather than, say, lead). This discovery can pave the way to a whole new technology and drastically change the outlook for electrically powered vehicles.

Last year brought evidence of an increasing recognition of Advanced Energy Projects as an important vehicle in promoting science-based technical innovation.

- o At a symposium on x-ray lasers held by the American Physical Society in April 1982, three out of four invited speakers were supported by Advanced Energy Projects.
- o Committee on Applications of Physics of the American Physical Society resolved to hold in March of 1983 a Symposium on Advanced Energy Projects. All five invited speakers are Principal Investigators on projects supported by this subprogram.
- o The Advanced Energy Projects subprogram initiated presentations of selected successfully completed projects at the annual Energy Technology Conference and Exposition in Washington, D.C. Those presentations attracted wide attention and resulted in concrete steps towards effecting the transfer of the respective technologies.
- o Several successfully completed projects have been picked up for further development either by industry or by other programs within the Government.

The Advanced Energy Projects subprogram is requesting $9,100,000 in operating expenses and $310,000 in capital equipment funds. The requested budget level will permit 13 new initiatives and represents a step towards attaining the goal of supporting 20 new initiatives per year.

	FY 1982	FY 1983	FY 1984 Request
Biological Energy Research			
Operating Expenses	$ 8,419	$ 9,500	$ 10,580
Capital Equipment	410	370	400
Subtotal	$ 8,829	$ 9,870	$ 10,980

The Biological Energy Research subprogram objectives are 1) to define basic biological phenomena and mechanisms in plants and microbes that relate to future enhanced biomass productivity and bioconversion of the most abundant materials such as cellulose, lignin and hemicelluloses; 2) to generate the underlying information for developing novel or improved fermentations for fuels and chemicals; and 3) to understand principles of biological phenomena which may be applied for energy conservation measures.

There have been numerous references in financial journals to heightened expectations that biotechnologies are to become one of the major new industries as the end of the 20th Century draws near. These projections are based on conceptual and technical advances in biology which have occurred in the last decade or so. These include recombinant DNA technology, cell and tissue culture procedures and broad progress in other biological areas. Such developments in biotechnology would touch not only medicine and the chemical and drug industry but also agriculture and certain parts of the energy industry. These developments will affect renewable resources such as biomass production and bioconversion, but there are good prospects as well for using biosystems in pollution control and in recovery of strategic materials from ores which otherwise require sizable amounts of energy for processing. Other biosystems may also prove to be important in an energy conservation mode. However these developments will not materialize in a timely and effective manner unless the base of fundamental biological information is developed. Biological Energy Research is unique in the federal research system designed to address these needs.

The Biological Energy Research subprogram is aimed at comprehending the limits to productivity in green plants (biomass) beginning with studies on photosynthesis, the key solar energy conversion process, and continuing with investigations on mechanisms of growth and development with emphasis on effects of and adaptation to stress by plants. The mode of transmission and expression of genetic information also receives emphasis. In the area of microbiology the subprogram is oriented towards understanding how various organisms degrade the abundant biopolymers cellulose, lignin and hemicellulose. In particular, understanding the conversions carried out by anaerobic organisms and those performed by thermophilic (high temperature) organisms are current goals. Such processes as methanogenesis which usually involve multiple species are given emphasis with respect to the interactions and interchanges biochemically between the organisms in the consortium. The genetics of organisms of importance in fermentations and other conversions but hitherto not studied genetically receives support. About 75% of the research is conducted at universities, 25% at national laboratories.

Some examples of recent research accomplishments include:

- A new pathway of energy conversion using inorganic phosphorous as a substrate has been discovered in anaerobic bacteria. The finding may result in a way of enhancing reaction rates in anaerobic digestors and sewage treatment systems to produce methane gas.

- Progress has been made in determining how plant systems sense temperature. A model has been developed based on evidence deriving from mutants suggesting that temperature perception is a balanced operation of two temperature sensors, one operative at the high end and the other at the low end. The molecular nature of these sensors is as yet unknown. This work is important since plants initiate adaptive processes in response to environmental sensing; conceivably this knowledge could be used ultimately to artificially adapt plants for specific environments.

- Growth regulation in plants adapted to sustained flooding has recently been clarified. Ethylene, a substance which has growth regulating properties is frequently produced by plants under stress. It is synthesized by certain plants in response to flooding. The ethylene thus produced induces pronounced rapid elongation of the plant sufficient to maintain contact with the atmosphere, without which the plant dies.

- A water soluble product from the fungal degradation of lignin has recently been isolated which is called acid precipitible polymeric lignin. This product has not been observed previously and could serve as a potentially valuable industrial chemical. A patent for this product is pending.

The specific areas of emphasis in FY 1984 include:

- Mechanisms of stress adaptation in plants
- Cellulose biosynthetic and biodegrading mechanisms
- Genetics of anaerobic microbes
- Microbial surface phenomena as related to immobilization and interfacing activities

The FY 1984 budget request is $10,580,000 for operating expenses and $400,000 in equipment. Increases sought will permit entry into a few research areas not previously supported (e.g., surface interactions of microorganisms) and would also allow the required strengthening of research efforts that have been initiated in recent years (e.g., genetics of anaerobic microorganisms, stress mechanisms in plants).

	FY 1982	FY 1983	FY 1984 Request
Program Direction			
Operating Expenses	$ 2,500	$ 3,100	$ 3,970
FTP/Total FTE's................................	52/56	54/60	58/62

The FY 1984 budget request for Basic Energy Sciences Program Direction is $3,970,000. These funds are required to provide for the salaries, benefits, travel and related expenses associated with the 62 full-time equivalents (58 full-time permanent, 4 other than full-time permanent) required to administer and support this program. This staffing level represents an increase of 2 full-time equivalents above the revised FY 1983 level. The increased funding is to provide for the additional full-time equivalents and normal increased personnel costs such as within-grade and merit increases, benefits and other support costs associated with programmatic increases. The increased funding further reflects the impact on average salaries of the FY 1982 and FY 1983 pay cap increases and two general pay increases in FY 1982 and FY 1983.

Basic Energy Sciences is a broadly diversified program responsible for mission-oriented research, the chief purpose of which is to provide the fundamental scientific and engineering base on which the Nation's future energy options depend. Its staff must possess expertise covering many subfields in the areas of chemistry, physics, engineering, metallurgy, geosciences, biology, mathematics and computer sciences, as well as in administration, procurement and financial management. The staff is responsible for development, direction, and management of complex technical programs, each involving one or more of the scientific areas mentioned above. Their activities include assessing scientific needs and priorities of the program, developing long-range program plans, technical review of proposals from laboratories and universities, monitoring the progress of ongoing university contracts, laboratory programs, and construction projects.

It is extremely important to appreciate the diversity and scope of the research effort involved in the Basic Energy Sciences program in order to understand the need for and justification for the requested level of Federal staffing. In FY 1983, for example, approximately 1,200 research projects will be underway either at agency laboratories or at more than 150 colleges or universities in 45 states. Therefore, each BES program official has a considerable number of projects to oversee. Evaluation, monitoring and management of this large number of diverse projects primarily from the Headquarters requires continuous contact with the contractors and laboratory staff and involves numerous workshops, planning meetings, and project reviews throughout the year.

The Basic Energy Sciences budget has continued to grow, and the FY 1984 request represents a significant increase above the FY 1982 level. At the same time, staffing during the past several years has remained constant. During recent years research projects at universities have increased from 18 to 26 percent of the BES budget, and the workload per university project is significantly greater than that for a laboratory project. This is especially true with regard to evaluation of proposals, of which approximately 10 percent of those reviewed are for new contracts each year. The result is that increased staffing resources are becoming more and more critical to maintain a strong core program, to evaluate expanding research programs in newer emerging priority areas having great potential importance to energy, to oversee management and operation of existing and new unique research facilities, and to promote early application of the results of this basic research.

In addition to the ongoing basic research program, this staff has been charged with management of the newly mandated three-phase Small Business Innovation Research (SBIR) program (Public Law 97-219). The law requires implementation of Phase I in FY 1983 which is expected to yield as many as 10,000 requests for the solicitation, resulting in approximately 1,000 proposals spread among 25 technical topics, and awarding of 100 contracts for up to $50,000 each. Workload in FY 1984 is expected to increase further, as approximately one-half of the FY 1983 Phase I awards go into Phase II and new Phase I awards are also made.

The FY 1984 request, therefore, reflects an increase of two full-time equivalents above the revised FY 1983 level to support programmatic growth and strengthening of research efforts across the board, but primarily in Materials and Chemical Sciences activities. This additional staff is required to support major new thrusts recommended by workshops and panels of the Council on Materials Sciences; to review and evaluate the efforts resulting from expanded operation of the NSLS, including the new initiative to provide greater access by industry and university users, and the WNR/PSR-LANL facility and full operation of the LBL Center for Electron Microscopy; and to strengthen selected high priority chemical research activities. This staff is also now responsible for managing operation of the Stanford Synchrotron Radiation Laboratory which was transferred from the National Science Foundation in FY 1983. In addition, establishment of a National Materials Research Center at LBL (TEC $138,900,000) will begin in FY 1984 to improve the linkages among academic national laboratories and industry scientists in the future advancement of high technology industries. In total the number of research projects to be managed by BES staff is expected to increase to nearly 1,300, excluding the SBIR program. The staff must implement and manage the SBIR program and continue to maintain close interaction with all of the technical programs of DOE, related R&D programs in other agencies, and special studies and assessments sponsored by the National Academy of Science and the scientific societies.

DEPARTMENT OF ENERGY
Energy Supply Research and Development
Basic Energy Sciences
(dollars in thousands)

Project Number	TEC/ TPC	Project Title and Location	Phase	Funds Appropriated To Date	Total Obligations		Total Cost		Remarks
					Planned	Actual	Planned	Actual	
84-ER-112	$138,900 $174,100	National Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California and Stanford Linear Accelerator, Stanford, California	Construction	$0	$0	$0	$0	$0	

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Sciences

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No. 84-ER-111

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts:

4. Date construction ends:

5. Previous cost estimate:
Less amount for PE&D:
Net cost estimate:
Date:

6. Current cost estimate: $19,700
Less amount for PE&D: 0
Net cost estimate: $19,700
Date: 2/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$19,700	$ 2,500	$ 2,500	$ 2,200
1985	0	11,000	11,000	7,830
1986	0	6,200	6,200	9,670

Work included for accomplishment with the first year's appropriation of $2,500,000 will include but not be limited to the design and engineering of beam line components and preliminary and detail design of the support area construction.

8. Brief Physical Description of Project

Current program planning anticipates the need for the beam lines listed below. However, programmatic requirements together with the state of the art at the time of construction may require a variation of the type and number of beam lines that would be most beneficial to the facility.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Beam lines and support area construction
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8. Brief Physical Description of Project (continued)

- 3 'Wiggler' lines
- 1 X-ray fluorescence microscopy line
- 1 X-ray core level spectroscopy line
- 1 Undulator for UV radiation
- 1 Line for medium and high resolution photoemission spectroscopy
- 1 Lithography line
- 1 Line for high resolution UV spectroscopy.

The project also provides for the design and construction of building space to house technical work areas and offices in support of these and other beam lines.

A. New Experimental Equipment

This project provides for an expansion of experimental capabilities which will be made available to general users at universities, industry, national and Government laboratories. Researchers will come from many disciplines with largest use from materials scientists, but with sizeable participation by biologists and chemists and other disciplines.

The new equipment to be provided will take maximum advantage of the properties of synchrotron radiation. The present programs needs are:

1) 3 multipole wiggler magnets together with associated experimental equipment. These magnets will be installed in straight sections of the x-ray ring and will provide copious X-rays at wavelengths as short as 0.1 A (energies as high as 100 keV). Radiation in this energy range will expand the capabilities of the facility beyond those provided by the radiation from standard beam ports.

2) A spectrometer for fluorescence microscopy. This device will use the high degree of brightness and tunability of synchrotron radiation to detect very small concentration of elements in a sample for materials, chemical, biological, and technical applications.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
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2. Project No. 84-ER-111

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8. Brief Physical Description of Project (continued)

3) A spectrometer for core level spectroscopy to be installed at the X-ray ring.

4) A multipole undulator and beamline front end to be installed in the VUV ring. This device, similar to a wiggler, will provide ultraviolet radiation more than 20 times as intense as that available at beam ports at the bending magnets. This increase in intensity will make possible studies of very dilute samples (e.g., gases or molecules deposited on surfaces).

5) Spectrometers for medium and high resolution UV spectroscopy.

6) A line to use UV radiation for lithography. This facility will provide users with the means to test the applicability of synchrotron radiation for the fabrication of small scale integrated circuits.

7) A high resolution gas phase spectrometer. This will be installed at the VUV ring for atomic and molecular physics studies.

A final decision on the specific beam line construction program will be made in the light of users needs at the start of construction.

B. New Building Addition

The proposed addition to the NSLS building will provide approximately 47,300 square feet of support space and promote increased utilization of the NSLS facility. The technical staff will move to new work areas, making more space available for the new beam lines. Extending the experimental space adjacent to portions of the VUV and X-ray storage rings will allow a number of long beam lines to be constructed, permit additional branching of existing ports, and give needed space to users for specialized support equipment.

The proposed expansion will be generally at the north side of the building. It will be a two-story structure of which about 24,000 square feet will be at the first floor level and contiguous to more than 30% of the perimeter of the X-ray experimental floor. Since the floor will be at the same level as the existing building, it will be possible to extend the lengths of up to three primary X-ray beam lines. The building will contain work areas for vacuum, instrument, and electronics technicians, and a staff shop for up to six machinists, all of whom will serve VUV and X-ray experimental users.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Beam lines and support area construction National Synchrotron Light Source (NSLS) Brookhaven National Laboratory, Upton, NY	2. Project No. 84-ER-111

8. Brief Physical Description of Project (continued)

The second floor will contain about 8,000 square feet, devoted principally to offices but with some space for workrooms and laboratories. Part of this space will be used by visiting research teams and part by the NSLS staff.

The VUV portion of the building will be expanded with the addition of about 5,600 square feet of experimental and support area including a receiving area to service VUV experimental equipment and a mezzanine. The expansions will provide important space for staging and possible extension of VUV beam lines. The addition of the mezzanine can easily be done since the building has a headroom of 18' - 0" in this area. The mezzanine can be used for vertically-deflected experiments or for support space.

A new third floor over the existing two-story building will add about 7,800 square feet. This will provide essential office space for approximately 26 people, a design/drafting area and miscellaneous support areas. This addition will cause a minimum of disturbance to the existing facility because a 'third floor option' was structurally built into the original design.

A tunnel, about 80 feet long (800 square feet), will connect this building with the basement of the adjacent Safety and Environmental Protection building. Part of the basement of this building contains important NSLS work and laboratory areas, including a clean room and X-ray and VUV sources for testing experimental equipment. The tunnel will integrate this valuable space with the NSLS building.

The expanded building will be designed to at least the same energy conservation standards as the existing one and contain a similar fire protection sprinkler system. Access by handicapped persons to the new third floor will be provided by extending the present elevator.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Beam lines and support area construction National Synchrotron Light Source (NSLS) Brookhaven National Laboratory, Upton, NY	2. Project No. 84-ER-111

8. Brief Physical Description of Project (continued)

C. Existing Facility

The NSLS consists of two electron storage rings, an injection system common to both, experimental beam lines, experimental equipment, and office and support area all of which is housed in a 74,000 square foot building.

The high energy X-ray storage ring provides for the possibility of 28 primary beam ports, each of which is capable of accommodating several experimental beam lines. The VUV ring provides for 16 beam ports which are also capable of accommodating several experiments each. In sum, more than 90 experiments can be carried out at one time when the facility is fully instrumented. In addition to general users, research groups called Participating Research Teams (PRT's) from universities, industry and national and Government laboratories, upon advice by a program committee, and approval by the Brookhaven National Laboratory (BNL) directorate, provide instruments to carry out research programs at the NSLS facility. Their instruments are made available to general users for 25% of the available experimental time. At present, such groups provide an additional 20 experiments at the facility. General users are able to use any of the experimental lines, PRT or community lines, upon approval of their experimental proposal.

9. Purpose, Justification of Need for, and Scope of Project

The NSLS is operated as a user facility. This means that researchers from BNL and other laboratories are able, after review of a proposal by a committee of distinguished scientists, and acceptance by the BNL Director, to carry out experiments using either the UV or X-ray radiation produced by the rings.

The response from users,both within BNL and outside, has placed a demand on the NSLS facility far surpassing its present resources. The limited beam lines which will be available combined with the limited space available makes expansion of experimental research within the present confines of this facility unpracticable. In order to support further development of this facility it will be necessary to provide additional floor, laboratory, and staging space. An experimenter should have a choice of a wide range of instruments which he can utilize for this research. To provide this choice, two types of instruments are proposed:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No. 84-ER-111

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9. Purpose, Justification of Need for, and Scope of Project (continued)

a) A group of instruments that will be available to general users that will complement in capability those already provided, and;

b) Several instruments (wiggler magnets and an undulator) which will provide a range of wavelength and intensity not available at the bending magnets. These instruments will be used both by general users and by members of the PRT's who will require such augmented capabilities for their experiments.

A. New Experimental Equipment

In the original development plan, provision was made for a total of eight beam lines to be available to general users. Additional beam lines were to be provided at the rate of about two a year out of capital funds. Further instrumentation was to be made available by PRT's, who would install beam lines at the rings at their expense and who would make 25% of the experimental time on those lines available to general users. However, the growth in user participation has far exceeded earlier expectations.

In order to provide experimental capabilities required both by PRT's and by general users, it is proposed to accelerate beam line construction. It is particularly important that the capabilities provided for in this project, such as wiggler magnets, be made available at the earliest possible date.

In addition to satisfying the requirements of the users, the accelerated design and construction of these beam lines will provide a cost saving because of efficiencies in planning, design, and construction.

B. New Building

The design for the NSLS building emphasized long term space requirements for the accelerator/storage rings and the equipment associated with their control and operation. Adequate space for experimental beam lines around the VUV and X-ray storage rings was also provided, although future long beam lines that extended beyond the building walls were regarded as a possible future option.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No. 84-ER-111

9. Purpose, Justification of Need for, and Scope of Project (continued)

The space for the machine and experiments was given highest priority in initial design, while support areas were provided to satisfy requirements for projected use during the initial years of operation. A possible expansion of experimental support areas, work areas, and offices and was allowed as a future option. Therefore, only minimal space was given to several general laboratories, the second floor office-administration area, and other support areas.

It was projected that during the early years of operations, up to approximately 50% of the 28 X-ray and 16 UV ports would be utilized. The extremely enthusiastic response of the scientific community now forces us to advance the expected rate of beam line construction and building expansion. More than 20 experiments have been proposed by PRT's for construction at an early date. This response, coupled with the community beam lines to be provided by the project, indicate that the experimental floor will be extremely crowded after October 1983 and additional support space will be essential.

The original design anticipated a possible need for future expansion. The building frame was designed to support a third floor over the office administration wing. Site utility lines were kept at least 30 feet from the building foundation. Adequate space was left between the NSLS buildings and the Safety and Environmental protection building.

In addition to the pressing need to return experimental floor space to its intended use, the expansion will provide adequate office space for the permanent staff and work areas to complement the research and development associated with the anticipated experimental and machine improvement programs. The short connecting tunnel between the NSLS building and the basement of the adjacent Instrumentation building will connect the NSLS staging areas to an area where now extensive NSLS vacuum, instrument, and diagnostic work is in progress and where UV and X-ray test sources are located.

Annual Costs

The estimated incremental operating costs of the proposed NSLS beam lines and support area construction are listed below. Costs are in the FY 1984 dollars.

	(Dollars in Thousands)
Materials, Supplies, Support Services	$ 94
Electric Power	150
General and Administrative	44
Total	$288

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Beam lines and support area construction National Synchrotron Light Source (NSLS) Brookhaven National Laboratory, Upton, NY	2. Project No. 84-ER-111

10. **Detail of Cost Estimate**[a/][b/]

	Item Cost	Total Cost
a. Engineering, design and inspection, including A-E fee (approx. 21% of item c)..........	$	$ 2,830
b. Land and land rights..........		0
c. Construction costs..........		13,375
(1) Beam line construction..........	6,450	
(2) Improvements to land..........	100	
(3) Building..........	6,660	
(4) Tunnel to S&EP building..........	95	
(5) Utilities..........	70	
d. Standard equipment..........		685
Subtotal..........		16,890
e. Contingency, approximately 17% of above costs..........		2,810
Total Project Cost..........		$ 19,700

[a/] Estimate is based on a complete conceptual design.

[b/] Escalation rates conform to the guidelines prescribed in the Department of Energy Field Budget Process Chapter, February 1982, which are based on the materials and labor data contained in the Energy Supply Planning Model and escalation rates forecasted by Data Resources, Incorporated (DRI). Current costs have been escalated by 9.3%, 9.1% and 8.4% per year for FY 1983 through FY 1985.

11. **Method of Performance**

This type of construction is unique and therefore the conceptual design, final design, assembly and testing will be done by the staff of the National Synchrotron Light Source of the Brookhaven National Laboratory. Component parts wherever possible will be fabricated by industry under fixed priced competitively obtained procurement actions. Some components may be fabricated in the existing shops at BNL. It is also anticipated that other laboratories, private consultants, and industrial firms will be used for advice on specific problems. Building design will be on the basis of a negotiated architect-engineer contract and its construction will be by a competitively obtained lump sum contract.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No. 84-ER-111

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	FY 1986	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item.........	$ 0	$ 2,200	$ 7,830	$ 9,670	$ 19,700
(b) CP&D...........................	0	0	0	0	0
(c) Expense Funded Equipment.......	0	0	0	0	0
(d) Inventories....................	0	0	100	100	200
Total facility costs...........	0	2,200	7,930	9,770	19,900
2. Other project costs					
(a) R&D necessary to complete construction of beam lines....	900	500	500	0	1,900
(b) Other..........................	0	0	0	0	0
Total other project funding....	900	500	500	0	1,900
Total project funding..........	$ 900	$ 2,700	$ 8,430	$ 9,770	$ 21,800

b. Total related funding requirement (estimated life of project: 17 years)

1. Operating costs..	$ 288
2. Programmatic operating expenses directly related to the facility........	0
3. Capital equipment not related to construction but related to the programmatic effort..	0
4. GPP or other construction related to the programmatic effort...........	0
5. Other costs..	0
Total other related annual funding requirements........................	$ 288

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Beam lines and support area construction National Synchrotron Light Source (NSLS) Brookhaven National Laboratory, Upton, NY	2. Project No. 84-ER-111

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
  1. Total Facility
    (a) Construction line item - no narrative required.
    (b) CP&D - no narrative required.
    (c) Expense funded equipment - no narrative required.
    (d) Inventories - it is anticipated that funds will be required for the procurement of special process spares.
  2. Other project funding
    (a) R&D necessary to complete construction - funds provided in the NSLS R&D budget. This item gives estimates of the R&D necessary to develop the monochromators, mirror systems, target chambers, detectors and superconducting structures for high field wigglers and undulators.
    (b) Other - no narrative required.

b. Total related funding requirements
  1. Operating Costs - There will be an annual requirement of additional materials, supplies, and support services associated with the new beam lines. Also, there will be a requirement for increased facility electrical power.
  2. Programmatic operating expenses directly related to the facility - no narrative required.
  3. Capital equipment not related to construction but related to the programmatic effort - no narrative required.
  4. GPP or other construction related to the programmatic effort - no narrative required.
  5. Other costs - no narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Sciences

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: National Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California and Stanford Linear Accelerator Center, Stanford, California

2. Project No. 84-ER-112

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None

6. Current cost estimate: $138,900
Date: 12/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$138,900	$ 25,900	$ 25,900	$ 17,000
1985		26,600	26,600	30,000
1986		26,700	26,700	27,300
1987		29,400	29,400	27,400
1988		23,300	23,300	28,400
1989		7,000	7,000	8,800

8. Brief Physical Description of Project

The proposed National Center for Advanced Materials (NCAM) will be located on University of California property adjacent to the Berkeley campus, within the site of the Lawrence Berkeley Laboratory. The project will include the construction of new facilities, and the alteration of, and additions to, existing facilities. Plant and site facilities will consist of: a) improvements to land, including grading, drainage, paving, lighting, and walkways; b) a new Surface Science and Catalysis Laboratory (SSCL) building (47,500 GSF); c) a new 82,000 GSF building for both the Advanced Materials Synthesis Laboratory (AMSL) and the Advanced Device Concepts Laboratory (ADCL); d) the removal of shielding blocks and certain utilities from 30,000 GSF of existing space in Building 6 and the addition of 28,000 GSF to Building 6 to house the Advanced Light Source, a special facility comprised of an electron storage ring and injection system, insertion devices for generating synchrotron radiation beams, and photon beams.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: National Center for Advanced Materials,
Lawrence Berkeley Laboratory,
Berkeley, California and Stanford Linear
Accelerator Center, Stanford, California

2. Project No. 84-ER-112

8. Brief Physical Description of Project (continued)

A complementary program at the Stanford Synchrotron Radiation Laboratory (SSRL) will provide for the construction of equipment to increase the brightness of synchrotron radiation beams from the existing 4-GeV SPEAR storage ring, for the construction of a 13,200 GSF building addition at SPEAR, for the construction of wiggler and undulator insertion devices and new beamlines at SPEAR and the existing 16-GeV PEP storage ring, and for equipment to improve injection into SPEAR and to eliminate effects of ground vibrations on SPEAR performance.

a. Conventional Construction

The Surface Science and Catalysis Laboratory will be a 3-story building that will have a reinforced-concrete frame, shear walls, waffle roof-and-floor structure supported on spread footings.

The ALS-related addition to Building 6 will be a high-bay, single-story, industrial building comprised of a heavy-duty concrete floor slab with a braced steel frame and a metal deck roof with insulation and built up roofing. The proposed AMSL/ADCL L-shaped 4-story building will occupy a hillside site providing a first floor with a main entrance at the grade level of the base of the hill. The third floor will align with, and provide direct access to, the lower floor of Building 80, a 2-story building housing the ALS control room, shops, staging areas and support facilities for the ALS.

At SSRL, laboratory and office spaces on two levels will be added on the south arc of the SPEAR ring. A beam line tunnel will be constructed from the PEP ring to a small underground experimental hall, and an access tunnel will be constructed to the experimental hall.

b. Special Facilities (The Advanced Light Source)

The Advanced Light Source (ALS) is the first accelerator designed explicitly to utilize insertion devices (wigglers and undulators) to provide increased photon brilliance (10,000 times better than existing synchrotron light sources); the accelerator also provides photon pulses having a very short pulse length (tens of picoseconds). The ALS consists of a 50-MeV electron linear accelerator, a 1.3-GeV booster synchrotron, a 1.3-GeV electron storage ring, and a number of photon beam lines extending from the insertion devices. Major components of the 170-m-Circumference storage ring are some 24 bending magnets and 84 focusing magnets. Special facility work at SSRL includes technical modifications and additions for SPEAR and its injection system so as to meet enhanced performance objectives, construction of in-vacuum insertion devices for the SPEAR and PEP rings, and components for the PEP undulator beam line.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	National Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California and Stanford Linear Accelerator Center, Stanford, California	2. Project No. 84-ER-112

9. Purpose, Justification of Need for, and Scope of Project

This research center is proposed as a scientifically logical redirection of the Lawrence Berkeley Laboratory with complementary augmentation of capabilities at SSRL, to address a vital national need, to accelerate basic research in an area that promises medium-term impact on high-technology industries, and to foster closer ties between national laboratory researchers and their counterparts in industrial and university laboratories. The NCAM project will have three major objectives:

- To enhance understanding, through long-range basic research, of the synthesis, characterization, and properties of advanced materials in support of U.S. energy-related and high-technology industry.
- To provide a next-generation synchrotron light source for U.S. materials science and engineering research.
- To provide advanced facilities for research training of additional graduate students in physical sciences and engineering fields vital to U.S. high-technology industry.

European and Japanese governments are supporting massive research programs to further their aggressive high-technology industrial development. For this country to mount a comparable interdisciplinary attack on the materials and materials-processing problems requires input from basic research efforts with longer time scales and higher risk than can be reasonably undertaken by U.S. industry. The research needed also requires investments in improved apparatus and instrumentation that will strain the present resources of publicly-supported materials laboratories in this country.

The NCAM project will provide the modern tools and facilities required for making possible major advances in energy-related and high-technology industries by improving the scientific understanding of the underlying chemical and physical phenomena that influence both materials and device behavior. A major component of the Center will be the Advanced Light Source (ALS), the first of a new generation of synchrotron light sources.

A further justification for the ALS is its next-generation performance as a light source. With a spectral brilliance of 10^{18} (photon flux per unit of phase-space volume), the ALS will make possible a whole new realm of experimental studies. Transient species on surfaces, excited states of atoms and molecules, and atomic configurations during phase transformations will become accessible to experimental investigation, as will the properties of matter under extreme conditions.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	National Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California and Stanford Linear Accelerator Center, Stanford, California	2. Project No. 84-ER-112

9. Purpose, Justification of Need for, and Scope of Project (continued)

The ALS will be a central tool for the three research laboratories that form the other major components of the NCAM:

- The Surface Science and Catalysis Laboratory (SSCL). A laboratory devoted to surface and catalysis studies using the ALS and other state-of-the-art instrumentation techniques.
- The Advanced Materials Synthesis Laboratory (AMSL). A laboratory devoted to interdisciplinary study of the synthesis and characterization of energy-related, high-technology, and strategic materials by use of the ALS and other means.
- The Advanced Device Concepts Laboratory (ADCL). A laboratory devoted to research on the design of high-technology devices utilizing new materials and the design of innovative devices for the characterization of materials-property relationships.

Both the SSCL and the AMSL will build on strong programs that already exist at LBL. The ALS and ADCL elements of NCAM are completely new, but they too build on experience and personnel already at LBL and at the adjacent University of California, Berkeley campus. For FY 1984 and FY 1985 the following programs will be initiated: (SSCL) zeolite characterization, atomic rearrangements on surfaces, and surface properties under extreme conditions; (AMSL) electronic materials synthesis, composite polymer synthesis, alloys, zeolite synthesis, high-pressure crystal structures and phase transformations, and mechanics of materials; (ADCL) x-ray lithography; structural design with brittle materials; three-dimensional solid state devices, high temperature SQUIDS, and photon generation and detection. For FY 1986 and FY 1987, the programs are being defined in collaboration with industry to serve the needs of the nation in regard to advanced materials.

Because of the pressing need to retain high-technology leadership, the proposed project schedule calls for the start of construction in FY 1984, the initial operation of the ALS in FY 1987, and the completion of all conventional and special facilities in FY 1989. Deferral of authorization would extend the time at which research results can be generated and transferred to U.S. industry. A NCAM Advisory Board composed of scientific leaders from industry, universities, and Federal laboratories will advise the LBL director on NCAM scientific program direction.

The existing Stanford Synchrotron Radiation Laboratory has outstanding user facilities that can be dramatically and quickly improved to complement the ALS in the hard X-ray region, thereby providing NCAM researchers with unparalleled photon brightness over an extended portion of the electromagnetic spectrum. Significant intensity improvements now being realized through the use of undulators at SPEAR have been due in large part to collaborative LBL/SSRL efforts, and a continuation of these cooperative activities is a cost-effective way of providing NCAM researchers with additional advanced tools to complement those available at the center.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: National Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California and Stanford Linear Accelerator Center, Stanford, California

2. Project No. 84-ER-112

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10. Details of Cost Estimate[a/][b/]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 26% of construction costs	$	$ 21,100
b. Construction costs		82,200
(1) Improvements to land, LBL	2,100	
(2) Buildings		
(a) SSCL, LBL 47,500 Gross SF (GSF) @ $150/SF	7,300	
(b) AMSL/ADCL, LBL 82,000 GSF @ $200/SF	16,500	
(c) ALS, LBL Building 6 Addition and Building 80 Modification	5,500	
(d) South ARC Lab Building, SLAC 13,200 SF @ $121/SF	1,600	
(e) SPEAR Insertion Device Shielding and PEP Undulator Beam Line Tunnel, SLAC	1,500	
(3) Special Facilities		
(a) ALS, LBL Accelerator Systems Insertion Devices, Photon Beam Lines	41,100	
(b) SSRL, SLAC SPEAR-Emittance and Aperture Reductions, Insertion Devices, 18° Beam Line,-PEP Undulator Beam Line	5,200	
(4) Utilities, LBL	1,400	
c. Standard Equipment		10,600
(1) SSCL, AMSL/ADCL and ALS, LBL	10,500	
(2) SSRL, SLAC	100	
d. Contingency @ 22% of above costs		25,000
Total		138,900

[a/] Includes Escalation at 10%/year

[b/] Based on SSCL Building Title II - Design, Remainder of Project Based on Conceptual Design

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: National Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California and Stanford Linear Accelerator Center, Stanford, California	2. Project No. 84-ER-112

11. **Method of Performance**

Engineering design of special facilities will be done by laboratory personnel, as will major technical component construction and assembly. Technical components and standard equipment will be procured by fixed-price subcontracts awarded on the basis of competitive bids.

Conventional facilities engineering design for LBL will be performed under a negotiated architect/engineer subcontract. Inspection and some engineering will be done by LBL personnel. Construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bids. At SSRL design will be accomplished by laboratory and managed by SSRL and SLAC Engineering.

12. **Funding Schedule of Project Funding and Other Related Funding Requirements**

	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Total
(1) Construction Line item	$ 17,000	$ 30,000	$ 27,300	$ 27,400	$ 28,400	$ 8,800	$138,900
Total Facility Construction Cost	17,000	30,000	27,300	27,400	28,400	8,800	138,900 (TEC)
(2) Other project funding							
a. Direct R&D operations	4,100	3,000	1,800	3,800	7,000	13,500	33,200
b. Capital Equipment	500	400	400	700	0	0	2,000
Total Other Project Funding	4,600	3,400	2,200	4,500	7,000	13,500	35,200
Total Project Funding	21,600	33,400	29,500	31,900	35,400	22,300	174,100

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: National Center for Advanced Materials,
Lawrence Berkeley Laboratory,
Berkeley, California and Stanford Linear
Accelerator Center, Stanford, California

2. Project No. 84-ER-112

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding

1. Total Facility Costs

(a) Construction line item - explained in items 8, 9 and 10.

2. Other Project Funding

(a) Storage Ring R&D activities include precision controls and instrumentation, a fast booster extraction system, and theoretical investigation of the stability of high-current beams.

(b) Insertion Device and Beam Line Optical Elements R&D activities include superconducting wigglers, in-vacuum undulators, and advanced beam line components.

(c) Capital Equipment related to ALS R&D includes equipment needed for the development of the items in the storage ring insertion device and beam line.

(d) ALS Startup/Operations funding requests are for operations staff training and startup of the injector in FY 1987, the injector and storage ring in the first half of FY 1988, and the nearly complete facility in the second half of FY 1988.

(e) SSRL R&D is related to the construction upgrade at SSRL.

b. Other Related Funding Requirements

The annual costs to the scientific program are increased progressively to build up a high quality research staff for the NCAM laboratories. Funding in the early years of the project is mainly to attract superior senior scientists to lead the new scientific programs described in Item 9. The capital equipment needs related to this research staff buildup reflect laboratory experience that numerous laboratory equipment items will be needed at the level of approximately 20% of the operating program budget.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Sciences

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-141

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: None
Less amount for CP&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $1,260
Less amount for CP&D: 0
Net cost estimate: $1,260

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$1,260	$1,260	$1,260	$ 400
1985	0	0	0	640
1986	0	0	0	220

8. Brief Physical Description of Project

This project provides for additions and modifications to accelerator and reactor facilities, which are supported by the Basic Energy Sciences Program. Since program priorities and needs change, the projects described below indicate the most likely projects to be funded. A continuing evaluation, however, is necessary to insure that those projects with the greatest productivity are funded. Two projects at the Brookhaven National Laboratory are requested to incorporate improvements at the High Flux Beam Reactor and the National Synchrotron Light Source. In addition, this project provides funds for upgrading the Argonne Physics Division's Dynamitron Accelerator and will also provide for improvements to the EN-Tandem Accelerator Facility by installing a data acquisition upgrade for atomic collisions research. Also this project provides for improvements required for the Electromagnetic Isotope Separation (Calutron) Facility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-141

9. Purpose, Justification of Need for, and Scope of Project

The following are the projected items of work to be performed at the various locations:

High Flux Beam Reactor Facility	$ 140

Funds requested are requested to assure the safe and efficient operation of the HFBR. Funds requested will be used for a second compressor at the Cold Neutron Facility in order to provide redundancy and assure continuity of operation. If the present compressor has to be removed from service for any reason, the facility must be shut down. A small building with a concrete pad will be constructed to house the new 400 horsepower helium compressor.

National Synchrotron Light Source	$ 500

Funds requested are for the large research machine which needs annual modifications, improvements and additions. Included are improvements for the: fast broadband transverse feedback system, upgrade of the dual line modulators, x-ray busbar system protection, automatic x-ray backout system, and the multiple permanent magnet wiggler. These improvements will improve the performance of the NSLS and therefore will enhance the usefulness of the facility for basic research.

Dynamitron	$ 100

The Dynamitron accelerator in Argonne's Physics Division has been a highly productive research tool since its installation in 1968. The machine has become increasingly employed for studies in atomic physics and is now primarily used for this purpose. The main experimental programs are concerned with the interactions and dissociations of fast molecular-ion beams in matter, with beam-foil spectroscopy, and with electron spectroscopy. The scientific excellence of these programs is widely recognized. All three programs have succeeded in attracting a steady stream of visiting scientists and students. In FY 1980, the accelerator was converted into a 4.5-MV machine. This significantly increased its usefulness for atomic physics experiments. In the proposed project, improvements are proposed which will raise the maximum voltage capability of the accelerator to 5-MV. Further, to obtain maximum benefit from the improved voltage capability, and to keep the accelerator competitive with more modern machines, a series of additional improvements are needed. Several of these improvements are expected to be implemented in FY 1983 (construction project data sheet 83-E-302, funded in the FY 1983 Presidential Budget at $300,000). The remaining improvements are listed below in priority order of need. The total estimated cost (TEC) for each improvement includes engineering cost and contingency.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations
2. Project No. 84-ER-141

9. Purpose, Justification of Need for, and Scope of Project - (continued):

1) Ion Sources .... $ 35

The work with molecular-ion beams is presently limited by the difficulty in obtaining several of the projectile species of interest. The beam-foil and electron-spectroscopy programs would greatly benefit from the higher energies available with multiple-charged heavy ions. Both problems can be solved by adding new types of ion sources to the accelerator. Furthermore, for structure determinations of molecular projectiles, it is important to know the states of vibronic excitation in the beam particles. It is planned to vibrationally and rotationally cool the projectiles by drifting them at low velocity (in the ion-source region) through low-pressure gas. It is therefore proposed to add a drift region in the high-voltage terminal.

2) Terminal Pumping .... $ 30

The maximum voltage attainable on the accelerator terminal is frequently limited (especially when accelerating heavy ions or molecular ions) by the poor vacuum in the neighborhood of the ion source. This situation will be dramatically improved with the installation of a remotely-controlled vacuum pumping system inside the terminal.

3) UHV Beam Line .... $ 35

To study the influence of surface interactions in beam-foil and electron spectroscopy, ultra-high vacuum conditions are necessary. It is proposed to construct a fully instrumented UHV beam line to transport the ion beams to an existing UHV target chamber.

EN-Tandem $250

The atomic physics program of the EN-Tandem is operated as a facility supporting the national effort in atomic collision research. To maintain forefront research capabilities, this facility must be continually improved to accommodate changing experimental needs and to keep pace with advancements in technology. This project is part of a continuing program to provide for those improvements that have been identified as having the highest priority. The activity of atomic collision research is rapidly outgrowing the existing mini-computer data terminal. As the Atomic Research user's group grows, and as the current accelerator improvement project nears completion, the present computing equipment will become increasingly inadequate. The purpose of this project is to: (1) provide data acquisition and storage for all beam lines, (2) provide direct computer control for selected equipment, and (3) provide on-line data analysis at the experimental site. The capability to provide complete

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Energy Research Analysis
Supporting Research and Technical Analysis
Energy Supply Research and Development - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Energy Research Analysis............	$ 1,993*	$ 2,824	$ 2,824	$ 2,869

*The FY 1982 Congressional Appropriation for Energy Research Analyses was $3,000,000, however, the above funding level of $1,993,000 reflects reductions for unobligated balances.

Authorization: Section 209, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Energy Research Analysis
(dollars in thousands)

FY 1983 budget...	$ 2,824
- Provide support for all program elements at the comparable FY 1983 level...	+ 45
FY 1984 budget request...	$ 2,869

Narrative

The Energy Research Analysis program is aimed at providing the agency with the capability for independent, objective analysis of the agency's technical needs and opportunities. Its current objective includes (1) assessing the adequacy of the technology base supporting R&D programs, (2) performing independent analyses and technology assessments of R&D programs, (3) providing coordination and direction in interagency activities such as acid rain, (4) developing issues and alternative actions to support policy decisions, and (5) providing support to agency advisory groups such as the Energy Research Advisory Board (ERAB). These activities are carried on through studies, workshops, panels and other mechanisms which permit the agency to make use of the best available scientific and technical talent both inhouse and from industry and academia. Projects are identified through staff analysis, contact with other agency program staff, contact with outside experts and through the various R&D program planning functions of the agency.

Recent Accomplishments

- Recent assessments of the adequacy of the agency's technology base included the review by the Fossil Energy Research Working Group (FERWG), an industry, academic and Government work group, who defined R&D needs in shale oil, tar sands and heavy oils.

- Program analysis completed during FY 1982-1983 were:
  - Two major program assessments (Basic Energy Sciences and Health and Environmental Research Programs);
  - Reviews of research objectives that led to a shift in program emphasis, e.g., Battery Storage Program;
  - An assessment by JASON, a group of physicists who are expert consultants to DOD, who concluded a review of "The Physics and Chemistry of Acid Precipitation."
  - Assessments which clarified the potential benefits of a program, e.g., the potential of ethanol as a transportation fuel for the Office of Alcohol Fuels.

- Recent and anticipated issue and alternative action studies were:
  - Issue papers prepared for the Under Secretary during FY 1983 and FY 1984 budget development;
  - Assisting in international representation of U.S. changes in Energy R&D policies (to the IEA).

- Recent agency coordination responsibilities included the subjects of:
  - Acid Rain, through participation in Interagency Task Forces (Transboundary Air Pollution Coordinating Committee & Interagency Task Force on Acid Precipitation).
  - Coordinating all the agency's action on acid rain research and providing input to Interagency Task Forces activities.
  - Strategic Minerals, through participation in the efforts of the Interagency Working Group on Strategic Minerals Policy.
  - Satellite Imagery, through participation in the Interagency Program Board on Civil Operational Land Remote Sensing from Space.

- Support of the assessments and advice provided by groups, such as the Energy Research Advisory Board (ERAB), to the Secretary.

Projected Activities

- o The FY 1984 Congressional Budget Request provides for:
  - Technology Assessments:
    - Up to three assessments of technologies (such as shale benefication, or methane production from biomass and microalgae) each year depending on complexity and depth.
    - Up to four program assessments (such as Solar, Wind, Geothermal, Photovoltaics or Waste Management).
  - Analyses of Research:
    - Benefit analysis of the quantifiable accomplishments of research programs (such as the research of the Office of Health and Environmental Research).
    - Reviews of research that crosscut agency programs for integration of objectives and direction approaches (such as acid precipitation).
  - Provide technical coordination and guidance:
    - Maintain Departmental coordination for Acid Precipitation, Strategic Minerals, Civil Land Remote Sensing.
    - Support the Director, Office of Energy Research, on reassessments of Department's R&D priorities, programs and technology base.
  - Provide independent peer review of technical or research subjects directed by principal Secretarial Offices or the Director, Office of Energy Research.
    - The Coal Combustion Research Working Group, an industry, academic and Government group, will define research needs in coal combustion by early FY 1984.
    - JASON and other groups formed for specific review tasks will be supported.
  - Advisory groups, such as ERAB, will be supported for the agency at the direction of the Secretary.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
University Research Support
Supporting Research and Technical Analysis
Energy Supply Research and Development - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Estimate	FY 1984 Base	FY 1984 Request
University Research Support (ER)				
Operating Expenses:				
University/National Laboratory Cooperative Research Program				
University Institutional Research	$ 1,981	$ 0	$ 0	$ 0
University Reactor Fuel Assistance	1,600	1,600	1,600	1,500
University Laboratory Cooperative Program	3,600	4,400	4,400	3,500
Energy Graduate Research Traineeships	1,000	0	0	0
Subtotal	8,181	6,000	6,000	5,000
Energy Manpower Development Program				
Energy Manpower Assessment	500	0	0	270
Energy Education and Training	1,700	0	0	200
Subtotal	2,200	0	0	470
Total, Operating Expenses	$ 10,381	$ 6,000	$ 6,000	$ 5,470

Staffing FTE Requirements included in "Advisory and Oversight Program Direction" decision unit.

Authorization: Section 209, P.L. 95-91, Section 31, Atomic Energy Act of 1954, Section 103(10), P.L. 93-483

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Energy Supply Research and Development
University Research Support
(dollars in thousands)

FY 1983 Appropriation enacted	$ 6,000
FY 1984 Base	6,000
Program increases and decreases:	
University Reactor Fuel Assistance	
o Reduces number of reactor sharing projects	- 100
Subtotal	- 100
University Laboratory Cooperative Program	
o Reduces number of participants in laboratory cooperative program	- 900
Energy Graduate Research Traineeships	
o None	0
Energy Manpower Assessment	
o Supports energy-related manpower supply/demand studies	+ 270
Subtotal	+ 270
Energy Education and Training	
o Supports 15 Prefreshman Engineering Projects	+ 200
Subtotal	+ 200
FY 1984 budget request	$ 5,470

Narrative Justification

The principal goal of the University Research Support Program (URS) is to ensure the maintenance of strong scientific/technical research capabilities in support of the long range energy R&D mission in both the university community and the national laboratories through the conduct of specialized research and research manpower development efforts. The URS program provides both a budgetary and programmatic focus for several efforts which involve universities both directly and in conjunction with the national laboratories and major contractors. The individual program efforts carried out through the URS program must relate to one or more of the following mission objectives:

- o Utilize the unique resources of the national laboratories (equipment, instrumentation, and personnel) for university faculty and student research and training.
- o Maintain and strengthen university-based energy research and manpower development efforts in selected high priority energy research fields.
- o Increase the number of students pursuing professional level degrees in energy-related science or engineering.
- o Enhance the quality of the scientific/technical workforce in the Department's national laboratories.
- o Help expedite the transfer of university-based energy research to potential users in the private sector.

Programmatically, the URS program consists of two major subprograms and an interrelated set of program activities. The first subprogram, the University/National Laboratory Cooperative Research Program, is directed at strengthening the capabilities of both universities and national laboratories as major energy research performers in the conduct of long range energy research. Many of the activities supported within this subprogram involve joint efforts between university and Laboratory-based scientists. The second subprogram, the Energy Manpower Development Program, includes efforts to increase the number of students pursuing energy-related engineering and science careers. This subprogram also fulfills the statutory responsibility for assessing the supply and demand of manpower for both current and projected energy R&D programs.

In order to carry out URS program objectives, a variety of approaches are used including university faculty research grants, student and faculty research participation in national laboratory programs, joint efforts involving laboratory and university scientists and support for the operation of unique university-based research facilities.

In FY 1983, the following major accomplishments are planned for the URS program.

- o Maintain strong cooperative relationships between the national laboratories and the university community through support for research and training activities involving faculty and students at the laboratories -- over 1,900 faculty/student participants are involved in URS-supported activities at 32 laboratories and contractor facilities.
- o Provide for the continuation of a domestic supplier for university research reactor plate-type fuel, through transfer of equipment and contracting responsibility from Atomics International, Canoga Park, CA, to Babcock & Wilcox, Lynchburg, VA. Reactor "sharing" projects will continue at 12-16 universities with reactor facilities involving faculty and students from over 100 colleges and universities that do not have direct access to such research facilities.
- o Help increase the supply of doctoral level engineering professionals by administering 57 graduate research traineeships in four engineering disciplines; each graduate student is involved in a dissertation research project of direct interest to either industry or a national laboratory.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-141

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9. Purpose, Justification of Need for, and Scope of Project - (continued):

data analysis and to transmit data to other computing centers will also be provided as feasible. Software and hardware will be compatible with the Holifield Heavy Ion Research Facility (HHIRF). Thus, it will be possible to take advantage of several man years of software development which has already been done for the HHIRF; also those atomic physics experiments which are moved to the HHIRF for higher energy measurements will require minimum software development.

Electromagnetic Isotope Separation (Calutron) Facility.. $ 270

Replacement and upgrading of the cooling tower servicing, by way of heat exchange to the secondary water system, both the Calutron magnet cooling oil and the demineralized water for the electromagnetic isotope enrichment progrm is required not only to insure that current requirements will continue to be met but also that the anticipated expansion in the program to meet national needs in medicine, industry, and research can be provided for. A 1981 engineering study of the current cooling system built in the 1940's indicated that the tower structure had severely deteriorated to the extent that adequate repairs would cost more than replacement with a new, more efficient structure. The consequence of not addressing the problem is the high probability of catastrophic failure an the resultant curtailment of isotope enrichment R&D and enriched isotope production for an extended period of time. The replacement unit will be based on modern technological design as available from industry and will utilize the existing catch basin and pumping systems.

10. Details of Cost Estimate

	Total Cost
a. High Flux Beam Reactor Facility..	$ 140
b. National Synchrotron Light Source Facility............................	500
c. Dynamitron..	100
d. EN-Tandem...	250
e. Electromagnetic Isotope Separation (Calutron) Facility.................	270
Total Project Cost.....................................	$1,260

11. Method of Performance

Design, engineering and inspection will be performed by laboratory staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Sciences

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-142

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 400
Date: 6/82

7. **Financial Schedule:**

Fiscal Year	Obligations	Costs FY 1982	Costs FY 1983	Costs FY 1984	Costs After FY 1984
Prior Year Projects	$ 300	$ 419	$ 0	$ 0	$ 0
FY 1982 Projects	$ 300	105	195	0	0
FY 1983 Projects	300	0	200	100	0
FY 1984 Projects	400	0	0	300	100

8. **Brief Physical Description of Project**

This project is required to provide for minor new construction, other capital alterations and additions, and for buildings and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. Funding of this type is essential for maintaining the productivity and usefulness of agency-owned facilities. Since it is difficult to detail this type of project in advance, a continuing evaluation of requirements and priorities may be expected to result in additions, deletions, and changes in the currently planned subprojects. In general, the estimated funding for each location is preliminary in nature, and is intended primarily to indicate the relative magnitude of the requirements. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under consideration.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 84-ER-142

8. Brief Physical Description of Project (continued):

The currently estimated distribution of FY 1984 funds by office is as follows:

Ames Laboratory	$ 275
Notre Dame Radiation Laboratory	25
Sandia National Laboratories	100
Total project cost	$ 400

9. Purpose, Justification of Need for, and Scope of Project

The following are examples of the major items of work to be performed at the various locations:

Ames Laboratory .... $ 275

Requirements include for example: extension of the energy management control system to several buildings ($160,000); upgrading roof for leak proofing ($70,000); upgrading cooling system in the computer area ($40,000); and miscellaneous small projects ($10,000).

Notre Dame Radiation Laboratory .... $ 25

Requirements include minor building modifications to properly house staff members and to make optimum use of laboratory research space.

Sandia National Laboratories .... $ 100

Operating experience at the CRF has shown that many experiments require laboratories larger than those currently available in the facility. As the research emphasis evolves from studies of simple basic flames and major chemical species toward work with more complex, realistic flames and with minor species and pollutants, the experiments necessarily become increasingly complex and require larger laboratory spaces. The conversion of light duty work space to heavy duty laboratory space will add room to expand some of the existing laboratory spaces.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-142

10. Details of Cost Estimate

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs included engineering, design, construction and inspection.

11. Method of Performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

- Continue the analysis of the supply/demand for manpower in energy R&D programs including preparation of the first annual report providing a comprehensive overview of manpower information in a variety of energy R&D areas.
- Support two approaches designed to strengthen the relationships between the national laboratories and minority universities through the support of joint research and manpower development effort involving the Lawrence Berkeley Laboratory and Jackson State University and the Argonne National Laboratory and Atlanta University.
- Complete 55 secondary school science teacher institutes on energy R&D concepts and prepare and disseminate appropriate scientific and technical summary information for use in secondary school science programs.

	FY 1982	FY 1983	FY 1984 Request
University Research Support	$ 10,381	$ 6,000	$ 5,470

The FY 1984 request for the University Research Support Program is $5,470,000, a decrease of $530,000 from the FY 1983 request.

Specific priorities at the requested budget level are as follows:

- Maintain support for a reduced number of student and faculty research participation projects at the National Laboratories and contractor facilities.
- Refuel up to six university nuclear research/training reactors and continue minimum level support for 12 reactor sharing projects.
- Update manpower assessments for future professional level (scientists/engineers) manpower requirements for energy research programs.
- Support cooperative projects with universities, industry and the Department's national laboratories designed to encourage secondary school students to pursue energy-related engineering and science academic programs.

The following sections describe the proposed activities to be carried out level within each of the major URS subprograms.

University/National Laboratory Cooperative Research Program	$ 8,181	$ 6,000	$ 5,000

This subprogram supports two research and manpower development-related efforts involving university faculty and students including a major emphasis on cooperative programs with the national laboratories and universities.

o University-Laboratory Cooperative Program .... ($ 3,500)

This program includes a number of efforts which bring university faculty and students (both undergraduate and graduate) to the national laboratories and other government contractor facilities for energy research and training. The goal of this program is to maintain the flow of bright, young research talent for future energy research programs by involving them in ongoing laboratory research programs. These activities also provide the laboratories with additional research capabilities through participating faculty and their universities.

The program is executed by taking advantage of the unique and diversified research facilities and resources of the national laboratories and contractor network. Support is provided to ten multiprogram laboratories and related university consortia (who interact with 50 Departmental facilities) for the placement of faculty, graduate, and undergraduate students in summer or academic year research and training programs.

The FY 1984 budget request level includes support for the following:

- Undergraduate Research: 600 undergraduate students will be supported in summer research assignments in the participating laboratories. Each student will be assigned to an ongoing laboratory research program and will be involved in "hands on" energy research. Special attention will be paid in FY 1984 to attracting undergraduate students in engineering who are in the top 10% scholastically in their respective colleges. The purpose of this effort will be to encourage the best undergraduate students to pursue graduate work in an energy-related engineering field.

- Graduate Student Research: Approximately 200 graduate students will be supported for summer or academic year research at the laboratories. In the past 20 years, over 3,000 graduate students have done their thesis research, on site, and received their degrees through this program. Particular emphasis is placed on involving the participating graduate students in research directly related to their PhD dissertations.

- Engineering Faculty/Student Research Teams: Continuing an effort initiated in FY 1982, three faculty/student research teams will be supported at selected national laboratories. Each "team" will carry out research on an engineering or applied research problem of mutual interest to the "team" and the host laboratory. Two or three students are selected to work with the faculty members on the project, and with a laboratory scientist who coordinates the overall program. A joint research report is prepared by the faculty/student team at the conclusion of the project. Any necessary follow on research is supported by the laboratory upon the return of the team to the university.

- Faculty Research: 120 university faculty members will be supported on energy research projects at the participating laboratories. These projects include either summer or academic year research assignments and can involve continued research on campus with support provided by the Laboratory.

- Special Energy R&D Training: 500 faculty and student participants will be supported in special energy-related workshops, short courses, and institutes held at the national laboratories on selected energy R&D topics and problem areas at the forefront of energy R&D. Topics covered by past workshops include breeder reactor technology, recent advances in thermal hydraulic research, and the physics of atmospheric boundary layer phenomena.

- University Reactor Fuel Assistance Program .... ($ 1,500)

The objective of this program is to maintain a domestic fuel fabrication capability for university research reactor facilities with MTR type fuel elements. The university-based nuclear research and manpower development effort is highly dependent on these specialized research and training reactor facilities. These dual purpose reactors are used for both research in the basic nuclear sciences as well as for graduate training purposes. Fuel for the reactors is fabricated under contract to the Department and "loaned" to the universities for use in the reactors. Additional support is provided to help defray reactor operational costs when the reactor is "shared" with researchers at neighboring universities. Support from this program ensures that a continuing fuel supply is available for the operation of university nuclear research reactors which in turn are essential national facilities for the preparation and training of professional level manpower for the nuclear industry.

FY 1984 will be the first year of full production by a new contractor (Babcock and and Wilcox) for the plate-type fuel required by the higher powered research reactors. At the budget request level up to six such reactors will be refueled during FY 1984 and 12 reactor sharing grants will be made on a competitive basis. Support will also be provided for costs associated with the transport of spent fuel to designated fuel recovery sites.

	FY 1982	FY 1983	FY 1984 Request
Energy Manpower Development Program	$ 2,200	$ 0	$ 470

This subprogram combines two manpower-oriented efforts--the Manpower Assessment Program conducts assessments and analyses of the supply and demand of manpower for both current and future energy R&D programs, and the Energy Education and Training Program supports activities directed at encouraging secondary school students to pursue energy-related science and engineering programs at the college level. Projects included in these two efforts are continuations and renewals of prior year budget activities.

- Manpower Assessment Program .... ($ 270)

Under Section 103 (10) of the Energy Reorganization Act of 1974 the program is required to assure "the collection, analysis, and dissemination of necessary manpower supply and demand data to carry out energy-related programs." In carrying out this mandate, the Manpower Assessment Program develops and maintains information systems in conjunction with other Federal agencies to provide both governmental and private sector managers with current and projected data on the supply and demand of energy-related scientific, engineering and technical manpower at all levels at the national, regional and state level. This information enables public/private sector policy makers and planners to determine the specific manpower-related implications (on national and subnational levels) resulting from various energy technology options and developments.

In FY 1983 the Manpower Assessment Program completed the analysis of data from the national 1982 Post Censal Survey (in cooperation with NSF) on the participation of scientists and engineers in energy. The Program developed a near and mid term forecast of the number and types of engineering, technical and skilled manpower required for the construction and operation of all energy-related facilities, by region and state. Continued analyses were carried out on the current and potential supply of new nuclear engineering and radiation protection graduates. This latter information is prepared for use by such groups as the Departmental nuclear programs, the Nuclear Regulatory Commission, the Institute of Nuclear Power Operators, and educational institutions providing or considering nuclear-related curiculum. The FY 1984 budget request of $270,000 will provide continued support for the collection and analysis of baseline-type data on the participation of scientists and engineers in the national energy effort. In addition, support will be provided for the conduct of "quick response" surveys on the supply/demand of manpower in specific energy technology areas. Each survey will be developed in conjunction with the National Science Foundation's annual surveys of scientists and engineers and in consultation with concerned energy industries. Forecasting techniques will also be developed to prepare a supply model for estimating near term availability of nuclear related professionals for advanced breeder reactor development programs and for the magnetic fusion technology program.

o Energy Education and Training Program.................................. ($ 200)

There is growing national concern over the quality of science and mathematics instruction in the nation's elementary and secondary schools and the quality and numbers of students pursuing engineering and science carers. This concern is directly related to the interests of the Department to help ensure that adequate supplies of trained professional manpower are available for future energy R&D programs. In prior budget years support was provided through the Energy Education and Training Program for a range of activities including summer institutes on energy R&D subjects for secondary school science teachers, the preparation and distribution of energy research-related instructional materials for use in secondary school science classes, and support for secondary school student training and research participation programs.

The principal emphasis for the Energy Education and Training Program in FY 1984 will be the continuation of 15 projects under the Prefreshman Engineering Program (PREP). This program is designed to encourage minority and women students to pursue energy-related engineering programs in college. Awards in this program are made to universities who, in turn, work with local school districts to select students for participation in a series of summer and academic year instructional and research programs in engineering and mathematics. Local industry provides substantial matching support for each project. In addition, research "apprenticeships" at five National Laboratories will also be supported to provide secondary school students (principally minority students) with "hands on" experience in energy-related research. Previous experience with both these programs shows that 75% of the participants go on to pursue engineering or science degrees in college. Finally, as in prior years, support will be provided for energy related student research projects at the International Science and Engineering Fair and similar student science competitions.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Advisory and Oversight Program Direction
Energy Supply Research and Development - Operating Expenses
Supporting Research and Technical Analysis
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Energy Oversight, Research Analysis and University Support				
Advisory and Oversight Program Direction				
Operating Expenses.........	$ 2,925	$ 2,603	$ 3,400	$ 3,400
Total........................	$ 2,925	$ 2,603	$ 3,400	$ 3,400
Staffing				
FTP/Total FTE's................	49/52	42/48	42/48	40/44

Authorization: Section 209, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
Advisory and Oversight Program Direction
(dollars in thousands)

FY 1983 Appropriation..	$ 2,603
Built-in increases..	797
FY 1984 Base..	$ 3,400
Program increases and decreases....................................	0
FY 1984 Budget Request..	$ 3,400

Advisory and Oversight Program Direction

The FY 1984 budget request for Advisory and Oversight Program Direction is $3,400,000. This represents an increase of $797,000 over FY 1983 which excludes the FY 1982 unobligated balance needed for program execution. These funds are required to provide for the salaries, benefits, travel, and other expenses associated with 44 full-time equivalents (40 full-time permanent, 4 other than full-time permanent) funded by this program. This staffing level represents a decrease of 4 full-time equivalents from the revised FY 1983 level. The requested funding will provide for the full-time equivalents, normal increased personnel costs such as within-grade and merit increases and benefits, associated support and severance pay. The funding further reflects the impact on average salaries of the FY 1982 and FY 1983 pay cap increases and two general pay increases in FY 1982 and FY 1983.

This program provides the personnel resources required by the Director of Energy Research to carry out his responsibilities under legislation (P.L. 95-91) and as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs. This staff performs in-house and external analyses and studies to meet the organization's responsibilities for monitoring the agency's research and development programs in order to advise the Secretary with respect to the well-being and management of the multiprogram laboratories. This responsibility includes advising on research activities carried out by any of the Assistant Secretaries; providing support for the Energy Research Advisory Board and Field and Laboratory Coordination Council; and providing program management of the Energy Research Analysis, University Research Support, and Multiprogram General Purpose Facilities (MGPF) programs and the University Research Instrumentation Initiative.

The FY 1984 request will provide the minimum staffing resources to support the following program areas:

1. It will support the Director at a reduced level in providing independent assessments of energy technologies and specific programs with varying degrees of complexity and depth. The staff will continue to provide benefit studies of the results of research programs, evaluations of research that crosscuts programs for integration of objectives and approaches, and independent peer reviews of technical or research subjects as directed by the Secretary or other top management officials.

2. This level will provide a reduced level of staff to implement and manage the university research support and education and training programs and maintain agency/university relationships to assure an adequate supply of trained professionals in energy-related fields. This staff will also implement the new University Research Instrumentation Initiative.

3. A reduced level of staff will provide advice on the management and well-being of the multiprogram nonweapons laboratories. This includes coordinating the institutional planning process, preparing the institutional plans for five ER multiprogram laboratories, managing the MGPF program, overviewing work performed by the national laboratories for outside agencies, and conducting studies of the laboratory roles and relationships. In addition, staff support is provided to implement the institutional planning process for single purpose laboratories and to support the R&D Laboratory Technology Transfer Program as mandated by the Stevenson-Wydler Technology Innovation Act. More recently added responsibilities include implementing the decisions of the Energy Research Advisory Board Multiprogram National Laboratory Panel. This staff will also serve as the Secretariat to an expanded, more effective Field Management Board which will review issues relating to the laboratories, and will manage the implementation of a more effective laboratory appraisal process by the operations offices.

4. The Energy Research Advisory Board will continue to be supported.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
University Research Instrumentation
Supporting Research and Technical Analysis
Energy Supply Research and Development - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Estimate	FY 1984 Base	FY 1984 Request
University Research Instrumentation (ER) Operating Expenses	$ 0	$ 0	$ 0	$ 6,000
Total, Operating Expenses	$ 0	$ 0	$ 0	$ 6,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
University Research Instrumentation
(dollars in thousands)

FY 1983 Appropriation enacted	$ 0
FY 1984 Base	0
Program increases and decreases:	0
- Provides support for the purchase of state-of-the-art research instrumentation by 20-30 university energy research groups...............	+ 6,000
FY 1984 budget request	$ 6,000

University Research Instrumentation

A new program initiative for $6,000,000 is proposed for FY 1984 as part of the combined public/private sector effort to help alleviate the serious, national shortage of state-of-the-art, scientific instrumentation in the major research universities. The overall objective of the new initiative is to assist universities to strengthen their capabilities to conduct advanced, long-range research in specific energy R&D areas.

Many energy-related processes and materials involve sub-microscopic particles, occur in such low yields, or are the result of such complex, high-speed reactions that they are difficult to detect and study without sophisticated instrumentation. Since the continued development of improved energy technologies requires comprehensive understanding of these materials and processes, university scientists conducting advanced energy research must utilize many newly designed instruments which have come into general use only during the past decade. Direct access to state-of-the-art instrumentation often determines whether scientists can produce frontier-level results. However, the cost of the equipment is so high that replacing obsolete equipment or obtaining new equipment is beyond the means of many research-oriented universities. The instrumentation involved includes a variety of scanning microscopes, microprobes, nuclear magnetic resonance infrared or ultraviolet spectrometers, X-ray microscopes and diffraction equipment, laser diagnostic equipment, etc., each of which costs in excess of $100,000. Thus, as indicated in a recent study by the Association of American Universities "the equipment used in the top-ranked universities ... has a median age twice that of the instrumentation available to leading industrial research laboratories," with a large fraction of the equipment being obsolete.

One approach to increasing the effectiveness of energy oriented research programs is improving the availability of such equipment. This can be done by: (1) making similar equipment at the national laboratories, other Federal laboratories and other universities more accessible, and (2) assisting university research groups which have priority needs for directly accessible equipment. During the last few years, the the national laboratories have been encouraged to increase the amount of time their research equipment is available to university researchers; and also has developed a number of unique, user-oriented research facilities (e.g., the Combustion Diagnostics Center and the National Synchrotron Light Source) equally available to university, industry and laboratory researchers has been constructed. Emphasis will continue to be placed on the cooperative use of existing equipment and facilities. Other research involves a large number of researchers and requires continued use of certain instruments. In such instances the equipment must be available on-campus.

Through its research programs, the Department provides a small amount of support for research instrumentation with about 10% to 13% of the research support provided through the Office of Energy Research used to purchase new university instrumentation. Such instruments generally cost of the order of $35,000 or less and do not have the capabilities of the sophisticated instruments referred to above. Aside from the major research facilities provided to the high energy and nuclear physics community, in recent years the Department also has allocated about $1,000,000 annually from its research funds for specialized research equipment. These funds have been used principally to provide instrumentation support to several university groups which are conducting research for DOE on such topics as microanalysis of materials, corrosion, etc.

The new instrumentation initiative will focus on those university research groups with demonstrated capability and experience in specific, designated research areas (e.g., combustion, biological energy conversion, catalysis, radioactive waste management, engineering research, etc.) of primary concern to basic and technological energy research programs. Those groups supported will be assisted in obtaining the additional sophisticated instruments, each generally costing in excess of $100,000, which will enable them to more effectively conduct advanced research in the designated program areas. Awards will be made following a national competition. Criteria for proposals evaluation will include the merit and accomplishments of the institution's current, applicable energy research programs, the potential for expanding and/or improving these programs if the new instruments are available on-campus, the institution's experience in planning for and utilizing other major research equipment, the availability of similar instrumentation at nearby institutions, the institution's commitment to energy research and its plans for meeting and sharing the total costs associated with the instrument(s).

The proposals will be evaluated by "subject area panels" composed of representatives from the energy activities research divisions and appropriate national laboratory and industrial staff members. The most meritorious proposals from each panel will be further reviewed by a source selection panel of the chairpersons of the above panels, with their recommendations being reviewed by the Director of the Office of Energy Research.

The $6,000,000 requested will enable some 20 to 30 university research groups to obtain some of the special research equipment they require to improve their capabilities to conduct energy research. This program will be coordinated with similar programs in other agencies, beginning with the exchange of lists of proposals to discussion of proposed awards. Such coordination will ensure that the instrumentation program will be directly complementary with instrumentation programs in other agencies and vice versa. Overall Federal level guidance to this and other instrumentation programs will be provided by the Interagency Working Group on University Research Instrumentation chaired by the Deputy Director of the National Science Foundation and reporting to the President's Science Advisor.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW

Supporting Research and Technical Analysis
Multiprogram General Purpose Facilities

The goal of the Multiprogram General Purpose Facilities (MGPF) program is to provide for the rehabilitation and replacement of multiprogram general support facilities which are essential to the continued operations of the agency's multiprogram sites. Multiprogram General Purpose Facilities are facilities which are suited for and utilized by many different programs where no one program uses more than approximately 60 percent of the facility. These include roads, railroads, site utilities, and support buildings such as laboratories, office buildings, shops, warehouses, etc.

The following facilities and sites are included in the program:

Ames Laboratory
Argonne National Laboratory (ANL)
Brookhaven National Laboratory (BNL)
Hanford Engineering Development Laboratory (HEDL)
Idaho National Engineering Laboratory (INEL)
Lawrence Berkeley Laboratory (LBL)
Lawrence Livermore National Laboratory (LLNL)
Los Alamos National Laboratory (LANL)
Oak Ridge National Laboratory (ORNL)
Pacific Northwest Laboratory (PNL)
Richland Operations (RL)
Sandia National Laboratories (SNL)
Savannah River Laboratory (SRL)

These multiprogram sites received over $3,000,000,000 in FY 1982 to perform National research programs in nuclear energy, fusion energy, basic energy sciences, nuclear physics, high energy physics, life sciences, solar energy, fossil energy, conservation, defense and others. Over 50,000 contract personnel are engaged in these activities.

The replacement cost of the existing general purpose facilities at the multiprogram sites exceeds $6,500,000,000. The MGPF program is required to rehabilitate and/or replace this inventory in a systematic and prioritized manner to ensure its continued viability. The program will be required as long as the multiprogram facilities are utilized to perform research and development functions for the agency. The program is an appropriate Federal role reflecting the responsible management of the Government's real property. The program is based on the premise that through continuous usage and aging, facilities deteriorate over time to a point where they are no longer appropriate for their intended functions and must be rehabilitated or replaced.

Accomplishments include:

o Initiated projects that:

- Replace worn out boilers in the 300 area of the Richland site.
- Correct hazardous road conditions at the Richland site.
- Provide adequate housing and systems for the security functions at Argonne National Laboratory.
- Correct hazardous railroad conditions at Idaho National Engineering site.

o Updated 1980 GPF Inventory.

o Continued projects previously approved.

In FY 1983 the program will:

- o Initiate projects that:
  - Rehabilitate power systems at ORNL, INEL, LLNL and RL.
  - Replace the electronics laboratory at ANL.
  - Replace a boiler and steam lines and upgrade the water system at BNL.
  - Construct an Emergency Response Center to coordinate response to a nuclear event at ORNL.
- o Continue projects previously approved.

The specific objectives of the program from FY 1984 to FY 1988 are to rehabilitate and replace deficient facilities which are essential to the continued operations of multiprogram sites, and to prolong the life of the Government's large investment in real property facilities at these sites.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Multiprogram General Purpose Facilities
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Estimate	FY 1983 Base	FY 1984 Request
Multiprogram General Purpose Facilities (ER) Construction:				
Buildings	$ 14,540[a]	$ 16,650	$ 16,650	$ 12,312
Site Utilities	13,600	14,950	14,950	20,488
Roads, Railroads and Other Open Space	5,000	2,400	2,400	3,800
Facilities Support Project	0	0	0	4,000
Total Construction	$ 33,140	$ 34,000	$ 34,000	$ 40,600

[a] Includes $540,000 in FY 1982 for Project 78-19A, which was transferred from the Departmental Administration Appropriation.

Authorization: Section 647, Public Law 95-91.

Department of Energy
FY 1984 OMB BUDGET

SUMMARY OF CHANGES
Multiprogram General Purpose Facilities
(dollars in thousands)

FY 1983 Appropriation enacted	$ 34,000
- Built in increases and decreases:	0
FY 1984 Base	34,000
Program increases and decreases:	+ 6,600
FY 1984 budget request	$ 40,600

Narrative Justification

The FY 1984 request of $40,600,000 is for continuation of construction of nine projects started in prior years and for the start of four critical projects. They are listed below by line-item number.

Project Number	Project Title	Laboratory Site	Total Estimated Cost ($000)	Total Prior Year Funding ($000)	FY 1984 Request ($000)
Ongoing Projects					
80-ES-11	Idaho Laboratory Facility	INEL	$ 18,000	$ 16,938	$ 1,062
81-E-325	Engineering Technology Laboratory	Sandia	17,600	12,000	1,600
82-E-301	300 Area Critical Utilities	RL	11,600	7,200	4,400
82-E-302	Security Facility	ANL	8,100	4,700	2,300
82-E-305	Traffic Safety Improvements	RL	6,200	5,400	800
83-E-308	Rehabilitate Power Systems	ORNL, INEL, RL, LLNL	15,830	5,000	7,988
83-E-309	Electronics Facility	ANL	8,500	1,200	4,150
83-E-310	Utility Replacements and Upgrade	BNL	12,000	1,300	7,500
83-E-311	Emergency Response Center	ORNL	4,200	2,000	2,200
Subtotal Prior Years			$102,030	$ 55,738	$ 32,000
Planned Projects					
84-ER-101	Rehabilitate Old Town Area Utilities	LBL	4,750	0	1,000
84-ER-102	Cooling Water Facilities	ORNL	4,000	0	600
84-ER-103	Road Repair	RL, LBL, INEL, ANL	16,000	0	3,000
84-ER-104	Facilities Support Project	Various	4,000	0	4,000
Subtotal FY 1984 Projects			28,750	0	8,600
Total			130,780	55,738	40,600

The request includes an increase of $6,600,000 over the FY 1983 request. The FY 1984 request brings the program to a funding level consistent with the extent and urgency of the backlog of facility requirements. In addition, it includes funding for the first time via the Facilities Support Project for much needed facility-related improvements that are intermediate in size (between $1,000,000 and $2,000,000). Projects in this size category are too large for traditional General Plant Projects (GPP) funding and are too minor in size and too many in number, for each to be afforded line item status on their own.

The Construction Project Data Sheet for this project identifies three projects in this size range that are under consideration (replace firehouse at BNL, make improvements to sewage treatment plant at ORNL, and rehabilitate water and waste treatment systems at ANL). Other projects bearing a revised higher priority may replace these projects with the resultant postponement in the projects presented. This flexibility to allocate funds to the highest priority project is considered highly desirable in assuring a distribution of funds to the facilities most in need at these laboratories.

The total estimated cost of the Facilities Support Project - $4,000,000 is consistent with the extent of the project backlog in the intermediate size range and the overall MGPF program request.

The planned projects are consistent with the agency's Institutional Plans for these laboratories and were selected as the current highest priority projects from a $1,400,000,000 backlog of proposed projects for correcting deficiencies in multiprogram general purpose facilities.

A brief needs statement for each on-going and planned project follows at the end of this narrative. Construction Project Data Sheets, which describe and justify each project, are included after the needs statements. The following sections provide background and perspective on the MGPF program.

Assessment of Facilities Condition and Adequacy--the Backlog

The MGPF program was established in FY 1981 to respond to the large backlog of facility support projects needed to maintain the adequacy of MGPF in fulfilling mission responsibilities.

The backlog estimated at $1,400,000,000 was quantified through a comprehensive inventory and assessment of all multiprogram general purpose facilities in multiprogram sites. Each facility was surveyed and evaluated by experienced facilities managers at the sites and deficiencies were identified, categorized and evaluated. Required minimum standards covering condition, capacity, location, safety and other factors were utilized to determine the extent of deficiencies. The consolidated results were reviewed and approved by field organization personnel and submitted to Headquarters via the Preliminary Institutional Plans. The total inventory of general purpose facilities at the sites includes 17,000,000 square feet of laboratory/office space and 9,000,000 square feet of other support buildings such as shops, service centers, warehouses, garages, cafeterias, and service buildings. Shown below are tables which display both the total inventory and the backlog of deficiencies by functional category and by laboratory. Replacement value of buildings in FY 1982 dollars is over $4,800,000,000; replacement value of utilities is in excess of $1,500,000,000 while roads, railroad tracks and other open space facilities exceed $350,000,000. Of the building replacement value, 20 percent are deficient and require rehabilitation or replacement. For utilities, deficiencies total $324,933,000 or 21 percent of the total replacement value; for roads and improved grounds, $120,502,000 or 34 percent are deficient.

Multiprogram General Purpose Facilities Program
Summary of Deficiencies and Replacement Value by Category
(in thousands of dollars)

Category	Requiring Rehabilitation	Requiring Replacement	Additional New Improvements	Total Deficiencies	Replacement Plant Value
Admin/Office/Light Lab/Buildings	$129,750	$386,669	$165,382	$ 681,801	$2,780,643
Other Buildings (Heavy Lab., Storage, Service, Other)	53,120	152,226	109,468	314,814	2,108,123
Subtotal Buildings	182,870	538,895	274,850	996,615	4,888,766
Utilities	73,148	167,659	84,126	324,933	1,531,920
All other GPF (Open Spaces/Site Improvements)	61,238	43,200	16,064	120,502	349,915
Total	$317,256	$749,754	$375,040	$1,442,050	$6,770,601

Multiprogram General Purpose Facilities Program
Summary of Deficiencies and Replacement Value by Laboratory Sites
(in thousands of dollars)

Laboratory Sites	Requiring Rehabilitation	Requiring Replacement	Additional New Improvements	Total Deficiencies	Replacement Plant Value
Ames	$ 0	$ 3,350	$ 3,350	$ 6,700	$ 52,850
ANL	18,863	25,210	16,600	60,673	445,015
BNL	55,600	109,300	69,000	233,900	360,200
INEL	86,750	130,374	33,650	250,774	1,521,561
LANL	16,500	0	10,300	26,800	669,112
LBL	15,743	0	10,030	25,773	282,873
LLNL	16,600	40,420	62,710	119,730	254,890
ORNL	60,200	121,200	55,400	236,800	1,594,000
Richland	0	219,900	0	219,900	730,100
Sandia	47,000	100,000	114,000	261,000	860,000
Totals	$317,256	$749,754	$375,040	$1,442,050	$6,770,601

Source: Preliminary Institutional Plan for FY 1983-88.

Factors Contributing to the Backlog and Measures to Reduce Increases in the Backlog

Several factors contribute to the extensive backlog:

1. Facility Support Lagged Operating Growth

Although the pattern in laboratory employment has changed in the last two years, the decade of the seventies was a period of expansion. Some laboratories doubled in size during this period as different types of research efforts were assigned to accommodate national objectives in energy. Real property support facilities did not keep up. The result is that existing facilities have been utilized well beyond their design capacities. This is especially noticeable in utility systems, roads, and laboratory facilities. Because adequate permanent facilities have not been available, the laboratories have, of necessity, converted space designed for other purposes (e.g., warehouse space) into laboratory space, have continued to rely on World War II barracks-type buildings which are limited in application, and have leased space off-site in several instances. Such solutions can seldom provide the quality laboratory space needed to meet today's research standards.

2. Aging and Deterioration

The aging and wear of facilities, particularly utility systems, affect the reliability of service and increase the downtime and routine maintenance costs for most systems. Real property at the laboratories averages 25 years with many of the facilities going back to the 1940's. Many of these buildings and utility systems have no remaining service life and must be replaced to continue operations at the laboratories.

3. Inadequate Building Practices

Much of the agency's original physical plant was built during times of crisis when either shortages of materials or the urgency of the programs dictated utilizing inferior materials and/or rapid construction techniques. These practices have resulted in premature aging of some of the plant and expansion of routine maintenance to keep the plant on-line. More recently, as programs expanded, temporary facilities such as trailers and prefabricated buildings have been used in lieu of permanent facilities. These have a much shorter life span, and in many cases, are unsuitable for the end uses for which they are utilized.

4. Lack of Institutional Support for GPF

Prior to the MGPF program, the installations suffered from a lack of institutional support largely because they accommodate many programs. All resident programs pay operating expenses to cover the work performed. However, only the assigned lead program (i.e., landlord) has been responsible in the past for providing general purpose facilities, which actually support many or all residing programs. More often than not, budget ceilings have prevented the lead program from accommodating both direct program requirements and institutional needs including general purpose facilities.

As part of the annual planning process for MGPF, several steps have been taken to assure that most of the above practices are not repeated.

1. The Institutional Planning and Site Development processes are designed to ensure orderly operation, maintenance, and growth (or reduction) of laboratories. These processes require consideration to be given to support facility needs prior to the introduction of any new program effort.
2. A more stringent and universally applied maintenance management system is being implemented to prevent the deferral of maintenance when it is detrimental to the physical well being of necessary facilities.
3. Better design criteria, earlier review of proposed facilities and more rigorous management during construction will be utilized for the MGPF program to keep the quality of construction high.
4. Finally the planning and programming process utilized by the MGPF program will assure that the proper attention is paid to potential critical deficiencies so that they may be corrected prior to any serious impact on mission accomplishment.

Needs Statement for Ongoing and Planned Projects
by General Category
(Site Utilities; Buildings; Roads, Railroads and Other)

Category Project Title Need Statement	Line Item No.	Laboratory Site	Total Estimated Cost ($000)
Site Utilities			
Planned			
o Cooling Water Facilities	84-ER-102	ORNL	$ 4,000
Required to replace a 38 year old cooling water system whose cooling capacity has been reduced due to deterioration and failure of several heat exchanger cells. The system is required for cooling and heat removal from experiments in the Y-12 area of ORNL.			
o Rehabilitate Old Town Area Utilities	84-ER-101	LBL	4,750
Aging and unreliable air, water, natural gas, and electrical systems will be rehabilitated and replaced to provide more efficient and reliable support to R&D program activities in the Old Town Area of the Laboratory.			

Category Project Title Need Statement	Line Item No.	Laboratory Site	Estimated Cost ($000)
Ongoing			
o Rehabilitate Power Systems	83-E-308	INEL, LLNL, RL, ORNL	$ 15,830
Required to correct deficiencies in electrical power distribution systems at various sites due to aging and deterioration. It will decrease the probability of interruptions in electrical service to critical research activities.			
o Utility Replacements and Upgrade	83-E-310	BNL	12,000
Required to meet the water supply requirements at BNL; and to improve the energy efficiency and reliability of the Central Steam Plant by replacement or renovation of components in the plant and steam distribution system.			
o 300 Area Critical Utilities	82-E-301	RL	11,600
Required to ensure reliability of 300 Area Steam Plant by replacing several aged and deteriorated coal and oil-fired boilers with coal-fired ones of slightly greater total capacity.			
Buildings			
Ongoing			
o Electronics Facility	83-E-309	ANL	$ 8,500
Required to relocate approximately 100 ANL personnel from structurally deteriorated, 30-year-old, wood frame and floor building, which was originally designed as a construction shed.			
o Laboratory Emergency Response Center	83-E-311	ORNL	4,200
Provides facilities needed to handle a major nuclear emergency. ORNL operates five reactors, processing facilities for transuranic elements, U-233, and high level waste storage.			
o Security Facility	82-E-302	ANL	8,100
Required to adequately house the Security Division (120 persons), and to replace the outmoded Alarm Communications System. The present quarters are in a 35-year-old quonset hut which does not provide adequate physical security for the armory or the Central Alarm Station.			
o Energy Technology Laboratory	81-E-325	Sandia/ALO	17,600
Required to provide adequate laboratory and office space for 450 persons. The energy programs which will occupy this facility are now spread across 42 buildings, 65 percent of which are substandard.			
o Idaho Laboratory Facility	80-ES-11	INEL	18,000
Required to provide adequate laboratory and office space for 450 persons. Present facilities are inadequate due to scattered location, condition and design.			

Roads, Railroads and Other Related to Open Spaces

Planned

o	Road Repairs	84-ER-103	RL, LBL, INEL, ANL	16,000

Required to restore primary and secondary roads for safe and reliable condition for vehicle use. Includes correction of base course and subgrade deterioration, repaving, widening to standard 12-foot lanes, installation of guard rails and restriping.

Ongoing

o	Traffic Safety Improvements	82-E-305	RL	6,200

Required to provide necessary highway improvements to meet increased traffic levels and to correct traffic safety hazards on the Hanford Site.

Other

Planned

o	Facilities Support Project	84-ER-104	Various	4,000

An annual request for funds to undertake construction projects of an intermediate size (from $1,000,000 to $2,000,000) that are needed to maintain the adequacy of multiprogram general purpose facilities in fulfilling mission requirements. The individual projects funded will meet the requirements of the Multiprogram General Purpose Facilities program but may differ from those identified in this request due to revised priorities. This flexibility to reprioritize needs assures that the most urgency intermediate sized projects are addressed in a timely manner.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

3. Date A-E work initiated: 1st Qtr. FY 1980

3a. Date physical construction starts: 3rd Qtr. FY 1981

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: $22,000
Date: December 1978

6. Current cost estimate: $18,000
Less amount of PE&D: 0
Net cost estimate: $18,000
Date: August 1980

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
FY 1980	$ 4,000	$ 4,000	$ 4,000	$ 327
FY 1981	4,938	4,938	4,938	2,905
FY 1982	4,000	4,000	4,000	5,651
FY 1983	4,000	4,000	4,000	4,300
FY 1984	1,062	1,062	1,062	3,000
FY 1985	0	0	0	1,817

8. Brief Physical Description of Project

The Idaho Laboratory Facility described in the FY 1980 Congressional Budget Request consists of a scientific and engineering development laboratory facility providing the space and equipment necessary to combine the basic engineering sciences needed to support programs at the Idaho National Engineering Laboratory (INEL). The facility is comprised of four basic areas: Electronics, Natural Sciences, Materials Sciences, and Engineering Test. Typical functions for this facility are instrumentation research and development, environmental testing, materials processing and evaluation, chemical metallurgy, chemistry, component development and tests, nondestructive evaluations, thermal fluids tests, model fabrication, and a computer control center.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

8. Brief Physical Description of Project - (continued):

The reduction in the cost estimate from $22,000,000 in the FY 1980 request to $18,000,000 in this request is the result of a decrease in the initial scope of the facility due to funding constraints on the Multiprogram General Purpose Facilities program. The reduction in scope was achieved through a reduction in the Natural Sciences area and deletion of a high bay building for engineering testing. The building is designed to permit additions of these features at a later time.

Because of budget restrictions, funding was not requested for this project in the FY 1981 budget. In view of the resultant deferred funding schedule, Congress was advised in July 1980, of the intent to proceed with design and construction of the office module portion of the facility as the most effective use of the funding appropriated in FY 1980. At the same time, Congress was advised of the intent to construct the facility near Idaho Falls, Idaho, based on an evaluation of operational advantages and cost savings over the life of the facility. This data sheet reflects these intended actions. The laboratory and support area portion will be a one-story building with approximately 70,000 square feet of floor space, and the office portion will be a three-story building with approximately 48,000 square feet of floor space. Both buildings will be steel frame structures built on grade slabs and enclosed with insulated metal panels. The total facility will provide work space for approximately 450 people.

The facility is comprised of modular elements containing laboratories, shop areas, test areas, offices and related support areas. The modular arrangement will accommodate future expansion requirements for the laboratory building to meet programmatic needs. The design of the facility will provide maximum flexibility of facility use throughout its lifetime. The layout of the various areas and accesses will facilitate installation and changeovers of equipment and test components. The total facility will be equipped with fire protection systems.

Equipment will consist of air compressors, air conditioners, water demineralization equipment and a substantial amount of laboratory equipment and furniture. Some major items are x-ray deffraction fluorescence equipment, electron microprobe, spark source mass spectrometer, ultrasonic welder, as well as major additions in instruments for mechanical and physical properties measurement.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

8. Brief Physical Description of Project - (continued):

The utilities required include water, sanitary sewer, electrical power, compressed air, a vacuum system, inert gas supplies and distilled water. Initial construction will include utility services sized to facilitate the future expansion of the Natural Sciences area and the addition of a high bay building for engineering testing.

Improvements to land will consist of asphalt parking and access roadways, some vegetation for buffer zones and outdoor lighting.

9. Purpose, Justification of Need For, and Scope of Project

The Idaho Laboratory Facility will provide a scientific and engineering development laboratory complex with multi-disciplinary experimental laboratories to conduct research in support of engineering programs (nuclear and nonnuclear at the INEL and national agency and NRC basic science programs). Major justifications for the complex include the following:

Inadequate Existing Laboratory Space

Laboratory space currently used is inadequate to meet requirements. Some laboratories are presently located in facilities which are abandoned radioactive reactor sites constructed in the mid-1950s, facilities without adequate cleanliness, noise abatement, or environmental control critical to laboratory operations. In some areas, any building modification, especially demolition of reactor piping, exposes radioactive contamination. Modifications to make such areas more useful are very difficult and costly. The existing component development area and equipment are too contaminated for the research activities being conducted in the area and the same is true of some of the fuels and materials areas. Some areas that should have ±3°F temperature control for reliable testing vary from below freezing in winter to 125°F in summer. Overcrowded conditions in existing laboratories result in schedule delays and inadequate working conditions for reliable laboratory procedures.

Current Programmatic Demands Cannot be Filled

Some important nuclear and nonnuclear programs cannot be adequately supported with the existing laboratory space.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

9. Purpose, Justification of Need For, and Scope of Project - (continued):

For example, certain geothermal efforts for which INEL is responsible are not being accomplished due to lack of adequate facilities in the areas of materials corrosion, heat transfer, fluid dynamics and polymers. Support of Defense Waste Management Programs, which are the long-range solution to Idaho Fuels Processing Facility high-level waste management problems, is severely limited due to lack of laboratory space. Present space limitations also restrict support of the nuclear materials security and safeguards R&D program for fuel reprocessing plants, and chemical engineering studies for the Alcohol Fuels Program technologies. As the center for Fusion Safety Research, new facility requirements will be encountered, such as thermal/fuels testing, materials corrosion, polymer research and structures testing. There are no facilities now available at the INEL for these activities.

Inefficiencies Due to Scattered Facilities

Due to the scattered locations of many of the existing laboratory facilities at INEL, considerable personnel travel time is required. Annual savings in travel time and motor vehicle use alone is estimated at $30,000 when the consolidated laboratory facilities are available. The existing scattered and diverse facilities result in redundant equipment, added maintenance costs, and inefficient use of personnel. More importantly, the wide dispersion of facilities is conducive to poor communications and insufficient interaction between researchers of different disciplines working on common problems.

Other Advantages of a Consolidated Facility

Other advantages of a consolidated, state-of-the-art laboratory include an increased ability to attract the quality scientific and technical personnel necessary for demanding R&D programs. Further, the multidisciplinary nature of an integrated laboratory facility promotes effective execution of R&D projects through cross-fertilization of ideas, theories, and techniques.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

10. Details of Cost Estimate*

Item	Item Cost	Total Cost
a. Engineering, design, inspection and project administration at approximately 16 percent of construction costs, item c.		$ 2,100
b. Land and land rights		450
(1) Land cost	$ 350	
(2) City annexation cost	100	
c. Construction costs		12,750
(1) Improvements to land	450	
(2) Buildings (118,000 sq ft laboratory office space at approximately $89.00 per square foot)	10,500	
(3) Utilities	600	
(4) Equipment	1,200	
Subtotal		15,300
d. Contingency at approximately 18 percent of above costs		2,700
Total Project Cost		$18,000

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by contracts awarded on the basis of competitive bidding.

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*Based on revisions of the original conceptual design to adapt to deferred funding and reduced cost estimate. Revised conceptual design completed September 30, 1980.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding							
(1) Total facility costs							
(a) Construction line item	$ 327	$ 2,905	$ 5,651	$ 4,300	$ 3,000	$ 1,817	$18,000
(b) Inventories	0	0	0	0	0	0	0
Total facility costs	$ 327	$ 2,905	$ 5,651	$ 4,300	$ 3,000	$ 1,817	$18,000
(2) Other Project funding							
(a) R&D necessary to complete construction ..	$ 130	$ 0	$ 0	$ 0	$ 0	$ 0	$ 130
(b) Other project related costs	0	0	0	0	200	0	200
Total other project funding	130	0	0	0	200	0	330
Total project funding (1 and 2)	$ 457	$ 2,905	$ 4,900	$ 4,300	$ 3,200	$ 2,568	$18,330

	Annual Cost
b. Total other related funding requirements (estimated life of the facility is 30 years and the equipment, 10 years)	
(1) Facility operating costs	$ 650
(2) Programmatic operating expenses directly related to the facility	12,600
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	500
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements ..	$ 13,750

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

(1) Total facility costs

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements - (continued):

(b) Inventories
Existing office furniture and laboratory equipment will be relocated from existing facilities.

(2) Other project funding

(a) R&D necessary to complete construction
The related R&D required for this project was that necessary for Conceptual Design which was $130,000 in FY 1978.

(b) Other project related costs
Other project related costs consist of the moving expenses required to relocate personnel and associated equipment from existing facilities to the new facility, based on 250 people at an estimated $800/person.

b. Total other related funding requirements

Based on an average per year for a 30-year life of the project.

(1) Facility operating costs
The major elements comprising the annual operating costs include: janitorial services, heating and ventilation costs, maintenance costs such as fluorescent tube replacement, blower filter replacement, boiler repair, etc.

(2) Programmatic operating expenses directly related to the facility
The programmatic operating expenses are based on 450 people at $28,000/year/person, which includes material and supplies.

(3) Capital equipment not related to construction but related to the programmatic effort in the facility
The estimated annual cost for capital equipment to support programmatic activities is $500,000. However, this cost will not begin until after 1986.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET SUBMISSION

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

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3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $17,600
Less amount of PE&D: 0
Net Cost Estimate: $17,600
Date: June 1980

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 3,800	$ 3,800	$ 336	$ 198
FY 1982	5,000	5,000	8,464	3,951
FY 1983	3,200	3,200	3,200	5,290
FY 1984	1,600	1,600	1,600	4,000
FY 1985	4,000	4,000	4,000	4,161

8. Brief physical description of project

This project provides for the construction of a light laboratory and office building, which will be a four-story structure with a full basement totaling approximately 144,000 square feet. This project will provide housing for approximately 450 people.

Improvements to land will include grading, paving, access drive, and landscaping. Exterior utilities will include the extension of existing services such as electrical power, water, steam and condensate lines, sanitary sewer, and communications duct. The FY 1981 funding appropriated provides for Titles I and II design of all three buildings.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico
2. Project No. 81-E-325

9. Purpose, justification of need for, and scope of project.

Sandia is a major energy technology center for the Nation. It is hampered in carrying out this important role by a severe lack of adequate space which the requested facility would alleviate. The construction of this facility would represent a long-term investment in a permanent national technology base for the future.

The technical programs to be located in this complex include Nuclear Waste Management and Environment, Fossil Energy Research and Development; and Geothermal, Solar, and Storage Technology. Specialized laboratories associated with these projects include facilities for evaluating the interaction of nmuclear wastes with geologic media, development of instrumentation systems for accelerating utilization of fossil energy resources, testing of advanced technology to aid geothermal and fossil drilling and logging, and optical measurement laboratories to assist the development of low-cost efficient solar collector designs. Sandia is expected to continue participation in long-term research and development in energy technology as well as experience real growth in defense programs' activities.

The growth of energy progress has severely strained an already tight space problem. Sandia was in the process of razing many substandard, prefabricated temporary World War II type structures. The razing program has had to be curtailed to accommodate the influx of energy assignments. The two directorates concerned with technical direction of energy programs (approximately 350 people) occupy portions of 42 buildings and structures.

Approximately 65% of this space consists of the substandard space described above. The required cost of conversion and maintenance of these temporary structures is high and not cost effective. Much of the present temporary space does not meet current construction code requirements, is of questionable structural integrity, wasteful of energy, and very costly to maintain. None of this temporary space meets the basic requirements for laboratory occupancy.

Sandia has played a key role in addressing the Nation's energy research and development programs in the past five years. Sandia will continue the lead laboratory roles already assigned. The required facility will provide new capability and improve the efficiency permitting joint use of special-purpose laboratories and facilities at Sandia Laboratories. For 30 years, Sandia has been a major cornerstone of national security. Because of its varied background, Sandia has become a unique and large versatile engineering laboratory with a demonstrated capability in systems management of both weapons and nonweapons programs, a staff representing a broad spectrum of scientific and engineering disciplines, and a comprehensive array of computational capabilities. This broad range of technical, scientific, engineering, and managerial skills which have been assembled at Sandia is an invaluable natonal resource. To perform effectively this critical assignment and to retain the professional staff, upgrading and consolidation of facilities are required to achieve the necessary economies of operation and programmatic efficiencies.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

10. Details of cost estimate*

a. Engineering, design, and inspection costs at approximately 6% of construction costs, item b.		$ 900
b. Construction costs		13,300
(1) Improvements to land including grading, landscaping, and paving	$ 500	
(2) Buildings		
(a) Laboratory and office, 144,000 square feet at about $83 per square foot	12,000	
(3) Utilities	800	
c. Standard equipment, relocate existing equipment		900
Subtotal		15,100
d. Contingency at approximately 16% of above costs		2,500
Total		$17,600

11. Method of performance

Design is being accomplished by negotiated architect-engineer contract and construction and procurement by fixed-price contracts awarded on the basis of competitive bids. Sandia Laboratories will subcontract for the relocation and installation of existing equipment.

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* Based upon actual cost of the Systems Research and Development Laboratory, which is to be duplicated by this project.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

12. Pending schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding:						
(1) Total Faclity Costs:						
(a) Construction line item	$ 198	$ 3,951	$ 5,290	$ 4,000	$ 4,161	$17,600
Total Facility Costs	198	3,951	5,290	4,000	4,161	17,600
(2) Other Project funding:						
(a) Conceptual design	30	0	0	0	0	30
Total Other Project Funding	30	0	0	0	0	30
Total Project Funding	$ 228	$ 3,951	$ 5,290	$ 4,000	$ 4,161	$17,630

b. Total Related Funding Requirements (Estimated life of project: 50 years)

(1) Facility Operating Costs	$ 900
(2) Capital equipment not related to construction but related to the programmatic effort in the facility	100
Total Other Related Annual Funding Requirements	$ 1,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total Project Funding:
(1) Total Facility Costs:
(a) Construction line item $17,600
(2) Other Project Funding:
(a) Conceptual design 30

Conceptual design was prepared by Flatow, Moore, Bryan & Associates, Albuquerque, New Mexico, at a cost of $30,000.

b. Total Related Funding Requirements:
(1) Facility Operating Costs .... $ 900

Utility, janitorial, and maintenance costs estimated at approximately $6 per square foot annually.

(2) Capital equipment not related to construction but related to the programmatic effort in the facility 100

An estimate of the equipment requirements to maintain the annual programmatic effort. No installations of new programmatic related capital equipment are anticipated.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $11,600
Less amount of PE&D: 0
Net Cost Estimate: $11,600
Date: March 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1982	$ 1,000	$ 1,000	$ 1,000	$ 243
FY 1983	6,200	6,200	6,200	2,525
FY 1984	4,400	4,400	4,400	3,000
FY 1985	0	0	0	5,832

8. Brief Physical Description of Project

This project will increase the reliability of the 300 Area Steam Plant by replacement of several aged and deteriorated boilers (coal-fired and oil-fired) and replacing them with new coal-fired boilers of slightly greater total capacity. The equipment to be replaced is 27 to 35 years old and is rated as being in marginally acceptable condition. This project will also upgrade the emissions control equipment to accommodate this increase in coal-fired capacity and will include the necessary modifications in coal storage and transport systems, breeching, steam and feed water piping, and auxiliary support equipment to make the new units an integral part of the centralized power house.

9. Purpose, Justification of Need for, and Scope of Project

Recent reliability studies revealed that the ability of the 300 Area Steam Plant to meet the peak demand steam rate is marginal This is due primarily to the fact that three of the six installed boilers have reached or exceeded their normal life and their present condition is deteriorated, that one boiler is inoperable and its refurbishment is not cost effective due to its

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

9. Purpose, Justification of Need For, and Scope of Project - (continued):

deteriorated condition, and that one of the two remaining large boilers is similar to the inoperable boiler and the length of useful life is marginal. Should one of the two existing large boilers become inoperative, the remaining four operating boilers, three small and one large, could not meet seasonal peak demands. Failure to meet steam requirements would not only require furloughing of personnel due to lack of heat and shutdown of non-R&D buildings, but it would adversely affect those operations utilizing steam to transport radioactive fluids and the delicate experiments being conducted in the Life Sciences Program where temperature variations could have large program impacts. Further steam reductions could result in shutdown of operations of programmatic laboratory buildings that require single pass air flow ventilation zoning for radioactive material operations within the buildings.

Organizations that would be affected by reduced steam flow and their steam consumption are:

Westinghouse Hanford	57 percent
Battelle	24 percent
United Nuclear	18 percent
Rockwell	1 percent

Periodic inspections have revealed evidence of boiler symptoms recognized in the industry as approaching end of useful life. During these inspections, metal areas that are becoming increasingly weak due to erosion have also been identified. Maintenance is becoming impractical because many replacement parts are no longer manufactured. Lack of replacement parts has resulted in the shutdown of the coal conveying system during the CY 1980 heating season. Postponement of the upgrading project can only aggravate the situation.

Replacing the aged boilers with new coal-fired boilers will increase the reliability of the steam plant to meet existing and future 300 Area steam demands, reduce the maintenance requirements, and provide the capability of maintaining an inventory of spare parts through commonality of components. Conversion to solid fuel-fired units will also reduce the site dependence on fuel oil.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 11 percent of construction costs, item b.		$ 835
b. Construction costs, including escalation and project management:		
(1) Improvements to land	$ 295	
(2) Special facilities and installation	7,475	
c. Standard equipment		0
d. Removal cost		745
Subtotal		9,350
e. Contingency at approximately 24 percent of above costs		2,250
Total Project Cost		$11,600

11. Method of Performance

Design and inspection will be performed by the fixed price contracts where feasible. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

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*Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding:						
(1) Total facility costs:						
(a) Construction line item............	$ 0	$ 243	$ 2,525	$ 3,000	$ 5,832	$11,600
(b) PE&D..............................	0	0	0	0	0	0
(c) Expense funded equipment...........	0	0	0	0	0	0
(d) Inventories........................	0	0	0	0	0	0
Total facility costs.............	$ 0	$ 243	$ 2,525	$ 3,000	$ 5,832	$11,600
(2) Other project funding:						
(a) R&D necessary to complete construction......................	0	0	0	0	0	0
(b) Other project related costs........	100	0	0	0	0	100
Total other project funding......	100	0	0	0	0	0
Total project funding (item 1 and item 2)...................	$ 100	$ 243	$ 2,525	$ 3,000	$ 5,832	$11,700

b. Total other related funding requirements (estimated life of project: 30 years)	Annual Cost
(1) Annual facility operating costs..	$ 2,600
(2) Programmatic operating expenses directly to the facility.................................	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility..	0
(4) GPP or other construction related to programmatic effort in the facility..................	0
(5) Other costs...	0
Total other related annual funding requirements..	$ 2,600

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 300 area critical utilities upgrading Richland, Washington
2. Project No. 82-E-301

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding:
   (1) Total Facility Cost:
      (a) Construction line item: No narrative required.
      (b) CP&D: None
      (c) Expense funded equipment: None
      (d) Inventories: None
   (2) Other Project Funding:
      (a) R&D necessary to complete construction: None
      (b) Other project related costs: Conceptual design report - $100,000.

b. Total Related Funding Requirements:
   The expected useful life of the steam plant was based on 30 years.
   (1) The facility operating costs are significantly less than other alternatives for providing these required support services. The annual operating costs for the steam plant consist of Labor - $780,000, Materials - $110,000, Electricity - $120,000, Maintenance - $130,000, Fuel - $960,000, and Miscellaneous - $500,000. Use of the existing fuel mix (85% oil, 15% coal) would increase the annual operating cost by $850,000/year.
   (2) Programmatic Operating Expenses: None
   (3) Capital equipment Not Related to Construction: None
   (4) GPP and Other Construction: None
   (5) Other Costs

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $8,100
Less amount of PE&D: 0
Net Cost Estimate: $8,100
Date: May 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1982	$ 1,500	$ 1,500	$ 1,500	$ 25
FY 1983	3,200	3,200	3,200	1,485
FY 1984	3 400	2,300	2,300	2,000
FY 1985	0	1,100	1,100	4,590

8. Brief Physical Description of the Project:

This project provides for new facilities for the Security Division (SEC), and a new site-wide Alarm Communication and Appraisal System (ACAS). This facility will house SEC personnel for a three shift operation 24 hours per day seven days per week. All personnel use building facilities for lockers, toilets, lunch, report writing and personnel supervision and administration. Personnel using the building on a full-time or part-time basis will total approximately 120 personnel. Parking facilities for approximately 70 vehicles will be provided.

The building is to meet agency minimum standards and provide a functional, energy efficient facility for SEC space; hardened primary command center for ACAS; secure weapons storage; offices, locker areas, assembly/briefing area, and training areas for personnel with a special purpose training area for riot control/physical security response training; weapons firing range; and exercise area; required storage for records, uniforms, and security equipment; and a suitable lockshop.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

8. Brief Physical Description of the Project - (continued):

The structure will consist of a single story building with lower level hardened central station and mid-level multipurpose training space. The gross area of the building will be approximately 24,000 square feet. The building is planned to have a steel frame with masonry curtain wall. Exterior glazing will be limited and earth berming will be used for thermal efficiency.

Partitions will be systems compatible with use, flexibility and life cycle cost. Final design procedures will include an update on construction life-cycle costs and energy efficient materials to assure maximum overall efficiency.

The Alarm System will consist of:

a. A dedicated security transmission cable loop around the Inner Circle Drive connected to Buildings 200, 202, 205, 208 and 212; a connection to Building 395 for the auxiliary command center; and a secondary loop to Building 331. This cable will be direct burial or carried with existing steam or utility lines as determined by final engineering and cost analysis. The cable will have a shielded line with coaxial video signal lines to carry high-speed data and video signals.

b. The Alarm Communications System with signal transponders in all buildings that have sensors; data processing monitors and graphic displays at primary and secondary command stations; LED displays and high-speed printers to record time, date sensor, and alarm or tamper; and a serially addressed test key system. Approximately 600 sensors are to be installed by 1981. The new system must connect to these 600 sensors and will have sufficient capacity for 400 additional sensors. The system will be computer compatible; however, no computer installation is anticipated at this time. Digitally driven random access microfilm projectors with facility maps and response directions will be provided in primary and secondary command centers.

c. The Video Alarm Appraisal and Surveillance System will provide pan-tilt, low-light television cameras with zoom lenses at this building and at Buildings 212, 316, 331 and 350 to cover perimeter alarm zones; and material access control identification and surveillance cameras both tied to and controlled from the primary and secondary command centers.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

9. Purpose, Justification of Need for and Scope of Project:

The Security Division's functions are related either directly or indirectly to three basic responsibilities: (a) protection of Laboratory personnel from injury or harassment, (b) protection of Laboratory property from theft, misappropriation or deliberate damage, and (c) protection of Laboratory classified information from loss or compromise. Security's present housing is in an old, energy inefficient, "temporary" Quonset hut which provides an inadequate amount, nature and quality of space. There is inadequate storage area for armament as well as special equipment that is needed to meet agency requirements for protection of special nuclear materials. An expanded armory with improved physical security, additional storage and maintenance space will be provided.

Security's vehicle fleet is parked in an open area. This facility will include a protected parking area.

The Central Alarm Station, which monitors critical areas, is also vulnerable. The room lacks adequate floor space for the future expansion of alarm coverage, communications equipment, and other items which are planned for a more efficient viable alarm station.

The need for a dedicated cable system is justified on the basis that the present telephone lines are: (a) inadequate for high-speed data video signal transmission; (b) cannot be expanded to meet the need to monitor approximately 600 sensor points; (c) susceptible to false alarm and failure due to lightning and electromagnetic interference; and (d) vulnerable to defeat by unsophisticated substitution components at unprotected telephone junction boxes.

The need for a multiplex digital alarm control system is justified on the basis of the inadequacy of the present 75-zone system for providing information for timely response to over 600 sensors presently being installed under the Safeguard and Security Improvement Program, and the agency requirement for a duplicate alarm monitoring capability at a primary and a secondary security command station.

The cable, alarm processing, and video system are mutually supportive and are needed as an integrated security system.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design and inspection at 12% of construction costs, Item b.		$ 399
b. Construction costs..........		3,324
(1) Site Work..........	$ 204	
(2) Buildings - 24,000 sq. ft. at $117/sq. ft.	2,809	
(3) Utilities..........	311	
c. Equipment..........		3,202
(1) Security Equipment..........	129	
(2) Alarm communication and appraisal system..........	3,073	
d. Demolition of vacated structures and relocation costs..........		128
Subtotal..........		7,053
e. Contingency at 15% of above costs..........		1,047
Total Project Cost..........		$ 8,100

11. Method of Performance:

Design and inspection will be performed under a negotiated architect/engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding, with the exception of the classified work of the ACAS which will be accomplished under a cost-plus-fixed fee (CPFF) contract.

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*Cost estimate based on a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

12. Funding Schedule of Project Funding and Other Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding						
(1) Total Facility Costs						
(a) Construction line item..................	$ 0	$ 25	$ 1,485	$ 2,000	$ 4,590	$ 8,100
(b) PE&D..................................	0	0	0	0	0	0
(c) Expense funded equipment................	0	0	0	0	0	0
(d) Inventories...........................	0	0	0	0	0	0
Total Facility Costs.................	0	25	1,485	2,000	$ 4,590	8,100
(2) Other Project Funding						
(a) R&D necessary to complete construction..	25	0	0	0	0	25
(b) Other project related costs.............	0	0	0	0	0	0
Total other project funding costs.....	25	0	0	0	0	25
Total project funding (items 1 & 2)...	$ 25	$ 25	$ 1,485	$ 2,000	$ 4,590	$ 8,125

b. Total Related Funding Requirement (estimated Life of Project: 25 years)

(1) Facility Operating Costs..	$ 0
(2) Programmatic Operating Expenses Directly Related to the Facility..........................	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility..	0
(4) GPP or Other Construction Related to Programmatic Effort in the Facility..................	0
(5) Other Costs..	0
Total Other Related Annual Funding Requirements.....................................	$ 0

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL	2. Project No. 82-E-302

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirments:

a. Total Facility
   (1) Construction Line Item: No narrative required.
   (2) PE&D: No narrative required.
   (3) Expense Funded Equipment: None
   (4) Inventories: Existing inventories will be transferred from present facilities.

b. Other Project Funding
   (1) R&D Necessary to Complete Construction: Approximately $25,000 was spent in developing the conceptual design.
   (2) Other Project Related Funding: None
   (3) Total Funding Requirements: Facility operating costs, shown as $0, reflect the fact that no additional personnel will be hired to occupy the building and that construction of the building will result in a net savings in operating costs due to the energy conserving construction which will be utilized.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: None

6. Current cost estimate: $6,200
Less amount of PE&D: 0
Net Cost Estimate: $6,200
Date: January 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1982	$ 3,800	$ 3,000	$ 3,000	$ 64
FY 1983	2,400	2,400	2,400	1,770
FY 1984	0	800	800	2,000
FY 1985	0	0	0	2,366

8. Brief Physical Description of Project

This project will provide necessary highway improvements to increase the traffic handling capacity and to correct traffic safety hazards on the Hanford Site. As currently evisioned, this will include the following:

a. Upgrade Route 10 by widening existing lanes to minimum highway standards and eliminate hazardous vertical curves.
b. Provide traffic control devices at high-volume, hazardous intersections.
c. Provide guard rails, signing, pavement markings, and crash protection barriers as appropriate.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

9. Purpose, Justification of Need For, and Scope of Project

The present road system is inadequate to handle the present and projected traffic volume on the Hanford Site. The proposed improvements will correct existing deficiencies as follows:

a. Upgrading of Route 10 (a secondary two-lane arterial from State Highway 240 to the Wye Barricade) will consist of widening, resurfacing, and providing shoulders to minimum highway standards and removing the hazardous vertical curves to improve passing and stopping sight distances. This improvement to Route 10 will encourage use by 100 and 200 Area traffic, reducee the volume of 400 Area traffic needing to merge with southbound 100 and 200 Area traffic and help relieve congestion on Route 4 South from the 400 Area to the 1100 Area.

b. These improvements will also reduce maintenance requirements caused by rutting and raveling at roadway edges resulting from heavy traffic on narrow lanes. Widened shoulders will provide room for vehicle recovery and emergency parking. Present shoulder widths do not allow safe emergency parking, thus, causing impairment to traffic and a safety hazard when a vehicle must stop.

c. At high-volume intersections acceleration and deceleration lanes are needed to provide safe entrance and egress.

d. Provision of guard rails, crash protection barriers, signing, lane markers, and pavement markings is required to upgrade Route 10 to minimum highway standards.

10. Details of Cost Estimate*	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 11% of construction costs, item b.		$ 510
b. Construction costs:		
(1) Improvements to land		4,750
Subtotal		$ 5,260

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*Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

10. Details of Cost Estimate - (continued):	Item Cost	Total Cost
c. Contingency at approximately 18% of above costs		$ 940
Total Project Cost		$ 6,200

11. Method of Performance

Design and inspection will be accomplished by a negotiated architect-engineering contract. The major portion of the construction will be accomplished under fixed-price contracts awarded on the basis of competitive bids. Relocation of any power or utility poles will be accomplished through negotiations with the appropriate utility.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding:						
(1) Total facility costs:						
(a) Construction line item	$ 0	$ 64	$ 1,770	$ 2,000	$ 2,366	$ 6,200
(b) PE&D	0	0	0	0	0	0
(c) Capital equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	$ 0	$ 64	$ 1,770	$ 2,000	$ 2,366	$ 6,200
(2) Other project funding:						
(a) R&D required to complete construction	$ 111	$ 0	$ 0	$ 0	0	$ 111
(b) Other project related costs	10	30	30	30	0	100
Total other project funding	121	30	30	30	0	211
Total project funding	$ 121	$ 94	$ 1,800	$ 2,030	$ 2,366	$ 6,411

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

12. Funding Schedule of Project Funding and Other Related Funding Requirements - (continued):

b. Total other related funding requirements (estimated life of project: 20 years):

	Total
(1) Facility operating costs	$ 75
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	$ 75

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding:
- (1) Total Facility:
  - (a) Construction line item: No narrative required.
  - (b) PE&D: No narrative required.
  - (c) Expense funding equipment: Not applicable.
  - (d) Inventories: Not applicable.
- (2) Other Project Funding:
  - (a) R&D necessary to complete: Conceptual design effort for this project is $111,000.
  - (b) Other project related funding: These costs are associated with project support and management activities.

b. Total Related Funding Requirements:
The facilities have an estimated life of 20 years.
- (1) Facility Operation Costs:
Operating costs including shoulder grading, patching, striping, weed control, resurfacing, etc., at approximately $75,000 per year.
- (2) Programmatic Operating Expenses Directly Related to the Facility: Not applicable.
- (3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility: Not applicable.
- (4) GPP or Other Construction Related to Programmatic Effort: Not applicable.
- (5) Other Costs: Not applicable.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 4nd Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $15,830
Less amount of PE&D: 0
Net Cost Estimate: $15,830
Date: April 1981

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1983	$ 5,000	$ 5,000	$ 5,000	$ 1,000
FY 1984	10,830	7,988	7,988	3,800
FY 1985	0	2,842	2,842	9,400
FY 1986	0	0	0	1,630

8. Brief Physical Description of the Project

This project rehabilitates parts of the electrical power distribution systems at the four agency locations listed below:

- Idaho National Engineering Laboratory (INEL)
- Lawrence Livermore National Laboratory (LLNL)
- 300 Area of Richland Site (RL)
- Oak Ridge National Laboratory (ORNL)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

8. Brief Physical Description of the Project - (continued):

The subprojects are described below:

Power Systems Rehabilitation, INEL - This project provides for correcting existing deficiencies in the main substation and in three of the area substations. Improvements to the main substation include replacing three main-feed 138,000-Volt oil circuit breakers which will not have sufficient fault current interrupting capacity by 1983. Lightning arrestors will be installed to provide proper surge protection for the Central Facility area-substation transformers colocated with the main substation. An additional oil circuit breaker will be installed to provide for isolating a long distribution line from the circuit supplying nearby area buildings. Additional switches, grounding, foundations, and hardware will be included to provide the needed improvements.

Three area substations remote from the main substation will receive system protection improvements including lightning arrestors, grounding, fencing, and hardware to adequately protect existing transformers from voltage surges. Also included will be the conversion of ungrounded (delta) distribution lines to an effectively grounded system with special transformers, resistors, and earth connections. A relaying system will be added to detect ground faults and to automatically isolate the faulted portion of the system utilizing existing circuit breakers.

Main Substation Transformer, LLNL - This subproject will consist of a new 115 kV - 13.8 kV, 3 phase transformer rated at 100 MVA, FOA (Forced Oil Assist). Associated equipment will include the necessary primary switchgear, lightning arrestors and buss supported on a low profile steel structure. Secondary switchgear will be housed in an addition located between Buildings 424 and 425.

13.8 Kilovolt Distribution Upgrade, RL - This project will upgrade existing substation C3-S4 in the southern part of the 300 Area to a 13.8 kilovolt (kV) switching station. The switching station will consist of fourteen metalclad switchgear cubicles in a prefabricated metal building with an underground cable vault. Ten 13.8 kV circuit breakers will be installed leaving space for two additional breakers as a replacement facilities are added in this vicinity. The remaining two cubicles will house control and metering equipment. Approximately 900 meters of underground duct banks and associated access manholes will also be installed to provide orderly circuit exits from the substation and integrated routing to existing, new and planned replacement facilities. Abandoned poles will be removed and their 13.8 kV and 2.4 kV cables will be relocated to the underground duct banks.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

8. **Brief Physical Description of the Project - (continued):**

Rehabilitate Electrical Service, ORNL - This subproject will provide for upgrading the 30-year-old electrical power system presently serving Oak Ridge National Laboratory (ORNL) research buildings in the Y-12 Plant area. It will provide for a new substation with a 50 MVA transformer to serve all the research experiments using the large DC motor-generator sets. The new transformer will be connected to a 161 kV unregulated feeder. The present 50 MVA transformer will be retained to provide emergency backup through secondary switchgear and will normally serve only the smaller, steady building loads from a 161 kV regulated feeder. A new oil circuit breaker will be installed in the main 161 kV Y-12 substation to provide switching of the regulated and unregulated 161 kV feeders for the two transformers.

9. **Purpose, Justification of Need For, and Scope of Project**

Power System Upgrade, INEL - The INEL is supplied with electric power from the Northwest Power Transmission System through three high-voltage lines owned by major utility companies. The three lines converge at a utility-owned transformer substation within the INEL. This substation reduces the supply to 138,000 Volts which is fed to the nearby Government-owned main INEL substation. This latter substation connects with the east and west terminations of the 63-mile long Government-owned INEL power loop. The substation and five remote area-substations provide the sole source of commercially generated electric power for the 893-square-mile INEL.

The existing main substation oil circuit breakers (OCB's) were installed during the original construction of the site in the 1950's. The installed short-circuit interrupting capacity was adequate for the many years that the power-grid fault-capacity was less than 1,500 megaVoltAmperes. Presently, if a short-circuit were to occur, the OCB's may not interrupt the fault and could fail. This failure could result in a total loss of power to the INEL if destruction was accompanied by the failure of additional equipment. In any case, the reactor facilities would not have a redundant power source and could not operate until the systems could be repaired, which is estimated to be four months.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

9. Purpose, Justification of Need For, and Scope of Project - (continued):

The original substation design did not provide adequate protection for high-voltage surges. In many cases, lightning arrestors were not installed. The overhead ground conductors on the 138,000-Volt lines provide shielding from direct strikes. Surges are still experienced, however, from normal switching and when induced by nearby lightning strikes. In addition, the low-Voltage lines do not have shielding. Continuing to expose the transformers to high voltage surges can only result in decreased transformer life and ultimate failure. At best, this would destroy power supply redundancy for reliable operation. At worse, multiple failures could leave one or more INEL areas without electricity for an extended time.

Much of the INEL area distribution system was designed using the three-wire (delta) ungrounded concept. This was a conventional system that was intended to be able to maintain power continuity despite a single conductor-to-ground fault. Widespread experience in the United States has shown that both reliability and safety are significantly lower in actual practice. Utility companies are quickly converting similar distribution systems to grounded systems to solve continuing problems.

The lack of an effective ground on three-wire systems sets up the condition for potentially destructive high-voltage transients. This was experienced between August 21 and 29, 1979, when electrical incidents occurred, which resulted in a total power outage at one INEL major reactor facility. This total power outage resulted in major work stoppage with personnel being sent home. As a result of these incidents, an investigating committee was appointed to determine the cause of the incidents and to make recommendations for avoiding similar occurrences. The committee concluded that the cause of equipment failure was excessive overvoltage caused by an arcing ground fault. The proper system grounding and protective relaying would have cleared the faulted circuit rather than causing the total system loss. On January 8, 1980, another power outage occurred at the same reactor facility. The incident resulted in melted bus bars and cracked bus bar supports. This incident is considered to have further aggravated the latent damage done during the previous incidents. Outages such as occurred in August and January at the affected facility may occur during or while preparation for a nuclear experiment is going on. The programmatic impact and accompanying financial losses implied are in the millions of dollars. Further review of all INEL areas disclosed that similar risks exist. This project will correct existing problems.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

9. Purpose, Justification of Need For, and Scope of Project - (continued):

Main Substation Transformer, LLNL - Electric power for LLNL and the Sandia Livermore Laboratory is provided by means of a 115 kV overhead transmission line from Pacific Gas and Electric's Tesla substation. Incoming 115 kV power is stepped up to a site distribution voltage of 13.8 kV by the three transformers in the main substation.

Current site electrical loads are carried by transformer No. 700 (56.0 MVA) and transformer No. 400 (22.5 MVA). In 1978, transformer No. 700 failed and was under repairs for approximately one month. During this month, transformer No. 400 was utilized in conjunction with transformer No. 100 (40 MVA) to carry the site load. Transformer No. 100 is now dedicated to Magnetic Fusion Energy (MFE) pulsing loads. A failure of transformer No. 700 today would require a shutdown of the MFE experimental work or a shedding of approximately 50% of the site load or some combination of both. The seriousness of the situation is compounded by the fact that the estimated order-to-delivery time for a replacement transformer is about 10 months.

Installation of the proposed new main substation transformer will eliminate the potential for a major electrical outage at LLNL and the Sandia Livermore Laboratory and will accommodate possible future increases in electrical demand.

13.8 Kilovolt Distribution Upgrade, Richland - This project upgrades the existing electrical distribution system in the 300 Area to increase the reliability and maintenance flexibility, and provide access to the system for replacement facilities being constructed in the southern portion of the area.

The 13.8 kV bus extension via expansion of the existing substation C3-S4 (Building 352-F) accomplishes the following:

- Provides switching capability allowing access to electrical systems through a substation rather than direct line tapping as is now necessary.
- Increases operating flexibility for load transfers during maintenance activities without interruption of customer service.
- Increases the reliability by establishing feeder positions for loads on the "power corridors."
- Provides switching and terminal connections for designated planned loads for replacement facilities in the south end of the 300 area.

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

9. Purpose, Justification of Need For, and Scope of Project - (continued):

Undergrounding the overhead line accomplishes the following:

- Separates normal and emergency power and communications circuits on a common pole line, serving the same facility. Major facilities affected include:
  - 331 Complex, where loss of power would destroy laboratory animals requiring delicate temperature control and other empirical data from ongoing biological experiments, at high cost.
  - 320 Building, a classified atmospheric physics laboratory with critical ventilation (white room) requirements and sensitive computers which cannot tolerate power variance.
- Eliminates the risk of a total power, fire alarm, and telephone outage, from a single pole failure.
- Eliminates overhead line interference with beneficial use of prime real estate for proposed new facilities. Two major facilities have already been forced to relocate their site plans resulting in the existing pole line crossing parking lots.
- Allows orderly site development preventing the electrical distribution system in the South end of the 300 Area from becoming as congested, inaccessible and unmaintainable as the electrical system in the North end.
- Complies with the 300 Area Site Planning to underground all utilities in southern part of 300 Area.

Rehabilitate Electrical Service, ORNL

ORNL facilities located in the Y-12 Plant were constructed in the early 1940's to house electromagnetic separation equipment. Since 1959, these buildings have undergone extensive and numerous internal renovations and modifications to make them functional for their changing application in support of multiple programs of ORNL. Currently, three major divisions of the Laboratory have exclusive use of these facilities for key programs which are central to the mission of ORNL as a major contributor to energy-related research.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

9. Purpose, Justification of Need For, and Scope of Project - (continued):

Electrical power service to the research facilities is currently provided via one 50 MVA transformer approximately 27 years old. Testing of this transformer by maintenance has revealed deterioration of the transformer. The tests as conducted by maintenance and known as Doble Tests which are nationally known and accepted tests for determining the deterioration in transformers over their expected life cycle. The consequences of this transformer failing are serious because it takes 12 - 24 months to repair or replace the units and the 20 MVA back-up transformer is not sufficient for 12 - 24 months operation until a new transformer would be available. In the back-up mode several Fusion Energy and Engineering Technology Programs would be seriously curtailed and two programs could not operate. In addition the operations of the Isotope Separation Program would be severly restricted. The programs which would be impacted by failure of the existing transformer are currently funded at over $30,000,000/Year (Staff of over 180). There currently are no surplus or spare power transformers of this capacity in the Oak Ridge Operations area. Major ongoing ORNL research programs would be stopped or seriously curtailed until repairs could be made.

Of further significance is the fact brought out in the engineering assessment that all three large power transformer failures which have occurred in Y-12 were in substations supplying ORNL facilities where large motor-generator (MG) sets were operating. Eight large MG sets of similar design are in operation and are connected to the 50 MVA transformer. It is apparent that these large MG sets operating in Y-12 have contributed to the frequency and severity of power transformers and switchgear faults. Past maintenance data shows that the reliability of transformers supplying the ORNL facilities in Y-12 where large MG sets are operating is not as high as the reliability of transformers serving the reminder of Y-12, ORGDP, and the TVA system. Given this degree of lower reliability in combination with the seriousness of consequences if the 50 MVA transformer fails, the risks of failure are higher than justifiable. The proposed upgrade will provide reliable, cost-effective electrical utilities to adequately support agency operations at the ORNL research facilities in the Y-12 plant.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

10. Details of Cost Estimate:*

	INEL	LLNL	Richland	ORNL	Total
a. Engineering and Design and Inspection	460	225	200	600	1,485
b. Construction Costs	3,780	1,525	3,200	3,700	12,205
Subtotal	4,240	1,750	3,400	4,300	13,690
c. Contingency (overall approximately 15.6%)	660	180	600	700	2,140
Total	4,900	1,930	4,000	5,000	15,830

11. Method of Performance

LLNL Subproject
Design will be on the basis of a negotiated architect-engineer contract. Major equipment requiring lead time will be purchased by LLNL early in the project on the basis of competitive bidding. To the extent feasible, construction will be accomplished by a fixed-price contract awarded on the basis of competitive bidding. Minor architect-engineering work and activation will be performed by UC-LLNL forces.

INEL Subproject
The responsibility for design and project management will be assigned to the INEL Prime Contractor under administration by agency-ID. Construction will be accomplished by contracts and subcontracts awarded on the basis of competitive bidding.

RL Subproject
Design and inspection will be by negotiated architect/engineer contract. Construction will be accomplished by fixed-price subcontracts which are awarded on the basis of competitive bids. The fixed-price contractor will procure the major engineered equipment.

ORNL Subproject
Design and inspection will be based on a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price prime contract awarded on the basis of competitive bidding.

*The cost estimates are based on completed conceptual designs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

12. Funding Schedule of Project Funding and Othe Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total Project Funding:						
(1) Total facility costs:						
(a) Construction line item.................	$ 0	$ 1,000	$ 3,800	$ 9,400	$ 1,630	$15,830
(b) PE&D..................................	0	0	0	0	0	0
(c) Expense funded equipment...............	0	0	0	0	0	0
(d) Inventories............................	0	0	0	0	0	0
Total Facility Costs.................	$ 0	$ 1,000	$ 3,800	$ 9,400	$ 1,630	$15,830
(2) Other project funding:						
(a) R&D necessary to complete construction..	$ 0	$ 0	$ 0	$ 0	0	$ 0
(b) Conceptual design costs*................	110	0	0	0	0	110
Total Other Project Funding...........	110	0	0	0	0	0
Total Project Funding (Items (1) and (2).............................	$ 110	$ 1,000	$ 3,800	$ 9,400	$ 1,630	$15,940

b. Total Related Funding Requirement (Estimated life: 30 years)

(1) Facility operating costs..	$ 175
(2) Programmatic operating expenses directly related to the facility............................	0
(3) Capital equipment not related to construction but related to the programmatic effort..........	0
(4) GPP or other construction related to the programmatic effort in the facility.................	0
(5) Other costs..	0
Total Other Related Annual Funding Requirements...	$ 175

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*Conceptual Design Reports completed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)
2. Project No. 83-E-308

13. **Narrative Explanation of Total Project Funding and Other Related Funding Requirements**

a. Total Project Funding
  (1) Total facility costs
    (a) Construction line item - no narrative required
    (b) PE&D - no narrative required
    (c) Expense funded equipment - no narrative required
    (d) Inventories - no narrative required
  (2) Other project funding
    (a) R&D necessary to complete construction - no narrative required
    (b) Conceptual design costs - Conceptual designs were completed in the fourth quarter of FY 1981 at a cost of $110,000.

b. Total Related Funding Requirement
  The useful life of these facilities for programmatic purposes is 30 years.
  (1) Facility operating costs - $175,000
  (2) Programmatic operating expenses directly related to the facility - The programmatic operating expenses are based on personnel costs. None
  (3) Capital equipment not related to construction but related to the programmatic effort - None
  (4) GPP or other construction related to the programmatic effort in the facility - no narrative required.
  (5) Other costs - no narrative required.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $8,500
Less amount of PE&D: 0
Net Cost Estimate: $8,500
Date: January 1981

7. **Financial Schedule:**

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1983	$ 1,200	$ 1,200	$ 1,200	$ 240
FY 1984	7,300	4,150	4,150	1,600
FY 1985	0	3,150	3,150	5,150
FY 1986	0	0	0	1,510

8. **Brief Physical Description of Project**

This project provides approximately 57,000 gross square feet of space for the Electronics Division (EL) at ANL/East and people from other divisions whose work interacts on a continual day-to-day basis with Electronics Division, a total of 111 personnel. Of the 57,000 square feet total, approximately 12,000 square feet are for mechanical equipment, penthouses and other utility areas. To promote technical interaction, the new building will be sited in close proximity to the Applied Mathematics Division.

The new building will have two above-grade floors and a full service floor. The design will assure economical delivery, handling and storage of electronic components, apparatus and supplies. Exterior architectural design will be aesthetically compatible with existing 200-area buildings. Construction will be masonry curtain wall with structural steel frame; special electrical considerations will be included; and the building envelope, fenestration and mechanical systems will be designed for maximum life cycle costed energy efficiency.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

8. **Brief Physical Description of Project (continued):**

Corridor, stairwell and toilet room walls will be concrete block. Partitioning systems compatible with use, flexibility, and life cycle cost will be installed in other areas. Acoustical ceilings will be used throughout, except in storeroom and mechanical equipment areas on the service floor and in the toilet rooms and locker rooms. Raised floors will be used in computer areas.

Parking areas to accommodate approximately 70 vehicles and access roads to the building entrance and loading dock will be provided. Concrete walks will be installed as required.

The cost of demolishing vacated structures and removing the debris is included in the total project cost.

9. **Purpose, Justification of Need For and Scope of Project**

The purpose of this project is to provide for the replacement of the existing buildings, 817 and 818, now housing the Electronics Division. The severe age-deteriorated condition of the existing facilities severely hampers operations and the ability to service Laboratory site and program requirements. The 817 and 818 facilities, originally designed as construction sheds, were built in 1948 and had projected lives of 10 to 15 years. The lives have now been extended by more than a factor of two. These buildings will require extensive structural, mechanical and electrical rehabilitation work if left standing, and will require additional replacement insulation if energy usage levels are to be met.

There are recurring multiple roof leaks which periodically cause damage to work in progress, paperwork, equipment and the building walls. Runoff rivers from heavy rains flow under the buildings, undermining the foundations. The outside walls are heat sieves. Expensive electronic equipment and computers are housed in sprinklered, wooden-framed structures. Facility utilization is severely hampered by these conditions. The present ramshackle housing depresses the morale of employees and makes recruiting more difficult, an important factor in view of the tight electronic engineering employment market.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

9. Purpose, Justification of Need For and Scope of Project - (continued):

The proposed building will accommodate a total of 111 persons. This includes all of the Electronics Division permanent and temporary personnel presently housed in Buildings 817 and 818 plus the Applied Mathematics Division, Engineering Division and Supply Division personnel who work directly with EL. Over 34,000 square feet of existing substandard space will be demolished. The operating efficiency of the relocated Electronics personnel will be enhanced because of the new building's improved configuration and because of the closer proximity to program division clients and Applied Mathematics Division counterparts.

The net usable area in the proposed building of 36,800 square feet compares with an existing 31,500 net square feet in the existing space. The difference is largely accounted for by the need to alleviate severe overcrowding in a few of the existing work areas, particularly those now occupied by the Applied Mathematics Division personnel.

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering design and inspection @ 12% of construction costs, item b.		$ 750
b. Construction costs		6,300
(1) Site work	$ 400	
(2) Buildings - 57,000 sq. ft. at $97.89/sq. ft.	5,580	
(3) Utilities	320	
c. Demolition and Removal of Debris		185
d. Relocation		135
(1) Staff and equipment	85	
(2) Microwave antenna (includes setup and power)	50	
Subtotal		7,370
e. Contingency @ 15% of above costs		1,130
Total		$ 8,500

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*Cost estimate based on completed conceptual design report.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

11. Method of Performance

Design and inspection will be performed under a negotiated architect/engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total Project Funding:						
(1) Total Facility Costs:						
(a) Construction line item....................	$ 0	$ 240	$ 1,600	$ 5,150	$ 1,510	$ 8,500
(b) CP&D..	0	0	0	0	0	0
(c) Expense funded equipment..................	0	0	0	0	0	0
(d) Inventories.................................	0	0	0	0	0	0
Total facility costs....................	0	240	1,600	5,150	1,510	8,500
(2) Other Project Funding:						
(a) R&D necessary to complete construction....	0	0	0	0	0	0
(b) Other project related costs...............	50	0	0	0	0	50
Total other project funding............	50	0	0	0	0	50
Total Project Funding (items 1 & 2).....	$ 50	$ 240	$ 1,600	$ 5,150	$ 1,510	$ 8,550

b. Total Related Funding Requirement (Estimated Life of Project: 25 years)	Existing	Proposed	Change
(1) Facility operating costs...	174*	243	69
(2) Programmatic operating expenses directly related to the facility...........	None	None	None
(3) Capital equipment not related to construction but related to the programmatic effort in the facility..	124	124	None
(4) GPP or other construction related to programmatic effort in the facility...	75	19	-56
(5) Other costs..	None	None	None
Total other related annual funding requirements......................	373	386	13

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* Only minimal maintenance is being performed on existing facilities due to severity of deteriorated condition.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL
2. Project No. 83-E-309

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding:
   (1) Total Facility Costs:
      (a) Construction line item - No narrative required.
      (b) PE&D - No narrative required.
      (c) Expense funded equipment - None
      (d) Inventories - Existing inventories will be transferred from present facilities.
   (2) Other Project Funding:
      (a) R&D necessary to complete construction - None
      (b) Other project related funding - Cost of conceptual design is given.

b. Total Related Funding Requirements: The costs tabulated here are listed in 1983 dollars.
   (1) Facility operating costs are a summation of the following cost factors:

Cost Component	Existing	New	Change
Maintenance..	33*	139	106
Utilities..	56	50	(-6)
Custodial..	29	48	19
Major Repair..	56	6	(-50)
Total..	174	243	69

   (2) EL serves many programmatic functions on site, but is not a direct programmatic effort; therefore, this item is recorded as none.
   (3) Capital equipment is the EL annual equipment budget and will remain constant.
   (4) GPP or other construction effort will be extensive for the continued use of the existing facilities. The buildings have exceeded their useful life and would have to be substantially rebuilt. The proposed facility expense would reflect roof replacement and major mechanical equipment toward the end of the 25-year estimated life.

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* Only minimal maintenance is being performed on existing facilities due to severity of deteriorated condition.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

3. Date A-E work initiated: 2nd Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 1st Qtr. FY 1986

5. Previous cost estimate: None

6. Current cost estimate: $12,000
Less amount of PE&D: 0
Net Cost Estimate: $12,000
Date: June 1981

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1983	$ 1,300	$ 1,300	$ 1,300	$ 260
FY 1984	10,700	7,500	7,500	2,800
FY 1985	0	3,200	3,200	7,500
FY 1986	0	0	0	1,440

8. Brief Physical Description of Project

This project provides for the installation of a new boiler at the Central Steam Facility, installation of approximately 13,600 ft. of underground steam and condensate piping to serve 22 buildings and the installation of one (1) new water supply well, a one million gallon storage tank, other modifications at the Water Treatment Plant Facility and construction of a new recharge basin.

1. Central Steam Facility

The proposed new boiler will have a rated capacity of about 125,000 lbs. per hour at 125 psig., be equipped with an economizer, soot blowers, forced draft fan with electric and steam turbine drives, feed water regulator, steam atomizing high efficiency and clean firing dual fuel burner(s) for burning 100% Alternate Liquid Fuel (ALF), virgin No. 6 fuel oil, various combinations consisting of ALF and virgin fuel oil and coal derived fuels, low excess air firing combustion controls-safety devices and alarms, thermix "Corten" stack, etc. The boiler will be connected to associated support systems, both new and modified, consisting of: combustion air, fuel oil, feed water and deaeration chemical treatment, steam, electrical, compressed air, drainage, etc.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

8. Brief Physical Description of Project - (continued):

Also included are the required building modifications to the Central Steam Facility for accommodating the new boiler configuration and auxiliary equipment arrangement. These building alterations relate essentially to reinforcing the structural steel members, raising a section of the roof line and the removal and replacement of the building sidewall to facilitate rigging in the new boiler.

2. Underground Steam Main Extension

The proposed steam main extension will provide new heating services for 22 buildings located in the central, eastern, and southern sectors of the Laboratory site. It will also result in the retirement of 15 independent and inefficient heating plants and conserve a total of approximately 46,000 gallons of fuel each year. Presently, these 15 units use approximately 165,000 gallons of fuel oil each year consisting of propane, residual and distillate oils. Transferring the heating load to the more efficient Central Steam Plant will result in the overall saving of fuel oil.

All of the steam and condensate lines to be installed will be in a conduit system with both lines insulated to reduce BTU losses. The total designed steam requirement for this project is well within the nominal capacity of the existing Central Steam Facility.

3. Water System Improvements

The expansion of the present Water Treatment Plant Facilities and the installation of one new water supply well is required to meet the water supply requirements of the Laboratory. Expansion work includes a new retention tank, monovalve filter, one million gallon elevated storage tank, interconnecting distribution piping and monitoring/ control instrumentation.

Expansion of the plant will also provide bypass piping and modifications to the facilities main flow distribution piping system. The construction of new dual infiltratin basins for recharging water and the reorientation and extension of existing drainage piping to a new more distant site with satisfactory permeable ground strata are also included.

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to improve the reliability and efficiency and reduce operating and maintenance costs for the central steam and water utility systems at Brookhaven National Laboratory.

1. Central Steam Facility

This project will materially improve the operating efficiency and reliability of the Central Steam Facility. The retirement of boiler No. 3, an inefficient 26-year old boiler which has surpassed its standard service life (25 years) and replacing it with an efficiently designed fuel and energy conserving modern boiler will bring the plant into compliance with state and federal particulate emission standards (6 N.Y. CRR Part 277 (c)).

The proposed new boiler will burn a non-critical form of fuel, namely an alternate liquid fuel (ALF) as its source of raw energy input. The ALF used at Brookhaven National Laboratory is formulated by selectively blending feed-stocks of recycled or previously used semi-miscible alcohols, mineral spirits, solvents and other combustible liquids to provide a homogeneous fuel of predictable BTU content, viscosity and flash point.

The total raw energy input to the Central Steam Facility is 1,000 billion BTU's annually of liquid fuel to produce steam for the entire Brookhaven National Laboratory site. This proposed project compared to the present mode of operation (using two boilers in lieu of one) will save approximately 105 billion BTU's of raw energy input (750,000 gallons) annually. Another important result benefiting the environment will be the corresponding reduction of boiler stack gas and particulate emissions to the atmosphere.

Under present operating conditions, boiler No. 5 (180,000 lbs/hour) is used for winter operation with boilers No. 3 and/or 4 in peaking or standby condition. With either boiler No. 3 or 4 down for annual service and a wintertime failure of boiler No. 5, the Central Steam Facility would not be able to provide sufficient steam for the various scientific and site facilities.

This boiler replacement will be instrumental in meeting the requirements of Executive Order 12003, the Interim Management Directive, "Fuel and Energy Use Policy for Facilities," and complying with the National Energy Act of 1978.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project - (continued):

2. Underground Steam Main Extension

The proposed extension of the underground steam system will replace a 36-year old low-pressure steam distribution system with a new high and low-pressure steam distribution system. The existing low pressure steam distribution piping is essentially a conduit system consisting of magnesia insulated steam and condensate lines supported inside a corrugated metal casing.

Over the years, fractures have developed in the underground casing that allowed water to enter the conduit system. As the seepage became heated, it dissolved both the insulation and the concrete pipe supports forming a hot alkali solution that then corroded the steel piping over an interval of time. This chemical reaction and subsequent corrosion has occurred at numerous points throughout the system. Not only has it critically impaired the heating system, but steam and condensate leaks have caused the failure of an essential 2400 volt electrical service and seriously jeopardized a 13.8 kV electrical service, fire alarm, and telephone trunk lines. These leaks have resulted in increased make-up water (approximately 6000 gallons per day) at the Central Steam Facility that must be heated and chemically treated. Continuing repairs to this underground steam transport piping and critical ancillary services have proved to be economically and operationally counterproductive toward continuity of scientific and support operations.

The installation of the new high and low-pressure steam mains in the central area of the site, expanding the high-pressure steam distribution system to the warehouse, shops, and maintenance areas, will facilitate:

a. The retirement of 15 individual heating plants burning No. 2 and No. 4 fuel oil and propane which operate at approximately 50 to 60% efficiency. Heating loads will be transferred to the Central Steam Plant which is about 80% efficient and which utilizes alternate liquid fuels that are classified by as non-critical or preferred fuels.

b. The conservation of about 46,000 gallons of fuel each year

c. Increased reliability of heat within the buildings added to the Central Steam System by this project.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.
2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project - (continued):

2. Underground Steam Main Extension - (continued):

d. Compliance with BNL's commitment to minimize air or water pollution and to meet requirements of the Federal Occupational Safety and Health Act, as well as those of the Environmental Protection Agency.

e. Improved steam generation performance as the 15 independently fired heating plants are unattended. The Central Steam Facility is continuously manned and is fully instrumented for prudent monitoring and control of boiler-burner operations.

f. The elimination of hot alkali solution from forming within the 36-year old steam and condensate system and leaking into the soil.

3. Water System Improvements

In 1977, Brookhaven National Laboratory commissioned Holzmacher, McLendon amd Murrell, P.C., to prepare a master plan for the site water system for the next ten years. The master plan included recommendations for the domestic water, cooling water and fire protection needs of the Laboratory complex. Camp, Dresser and McKee was commissioned in 1978 to perform an indepth engineering survey and evaluation of the Water Treatment Plan Facilities and to develop a master plan based on recommendations for improvement and expansion of the Laboratory water system to meet immediate and future demands in a reliable and cost-effective manner as follows:

a. Additional Well Supply during the summer, peak demand on the domestic water system exceeds the combined pumping capacity of the present well system. The seriousness of this situation has been thoroughly considered and has resulted in the recommendation that an additional well be installed, as soon as possible, to meet these rising water demands.

A secondary condition that must be factored into this water supply matrix is the increasing possibility of mechanical and/or electrical failure of existing well pumping equipment due to age and maximum usage. Reinforcement of the well pumpage system with a new well would provide backup against this.

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project - (continued):

3. Water System Improvements - (continued):

b. Retention Tank

A complete loss of water treatment polant capacity will occur if the present retention tank is removed from online service for maintenance or equipment failure. The analysis of the retention tank design parameters clearly showed that at high water flow rates (4,000 gpm) into the plant, the tank is grossly underdesigned, thus precluding effective treatment. Even at medium or average flows, the tank is several times smaller than required. Both outside engineering firms have confirmed this conclusion.

c. Monovalve Filter

The monovalve sand filters are not adequate to effectively treat peak flows through the plant and an additional 1,500 gpm filter will be added and put in parallel with the other filters. Once constructed, the new filter will provide greater flexibility in day-to-day plant operations by reducing the hydraulic overlead on the older filters, improving process treatment and plant performance during the peak demands which are increasing in frequency and duration each year. It will also provide necessary backup for the other filters during repairs, malfunctions and maintenance, while providing some potential for increased capacity.

d. Storage Tank

The required fire flow for an emergency situation is 4,000 gpm continuously for a four-hour period. BNL does not meet the fire underwriters minimum requirements of supplying the maximum fire flow when required.

Based on the studies that have been done, construction of a one million gallon water tower is required if adequate and reliable protection for fighting a serious fire at the Laboratory is to be reasonably assured.

9. Purpose, Justification of Need for, and Scope of Project - (continued):

3. Water System Improvements - (continued):

e. Piping and instrumentation

The addition of a new retention tank and filter will require piping modifications to the plant's raw water system and treated water systems. To assure more flexible and reliable day-to-day and seasonal plant operation, it is planned to provide adequate piping and valves to be able to bypass or isolate each treatment module (e.g., aerator, retention tank, filter, etc.) in the plant treatment system. In this manner, units can be taken out of service for repairs and maintenance without closing down the entire plant as is now required.

To assure that state and federal drinking water standards are met, continuous monitoring and optimization of potable water quality and filter performance can be achieved by the installation of additional instrumentation including: chlorine residual monitors and analyzers, filter effluent turbidimeters, filter loss of head indicators and backwash frequency recorders.

f. Recharge Basins

Camp, Dresser and McKee was also commissioned (1979) to investigate the cause for AGS recharge basin failure and determine what effect their continued heavy loading would have on the underground water table.

At the time of the investigation, the basins were overflowing due to iron plugging of the basin's surface strata, causing severe flooding on the east side of the site. Also, their continued heavy use, over a twenty-year period, has deteriorated and essentially exhausted the percolating capability of the basin's soil formation.

In addition, the heavy loading of the recharge basins has increased the groundwater table in the area. Evidence now exists that a groundwater mound has formed a gradient between the recharged water and the normal underground water sources for the potable wells. These conditions could lead to infiltration, and should be avoided since they could result in water quality degradation and contravene accepted standards of good water management practices.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project - (continued):

f. Recharge Basins - (continued):

As a short-term solution to the basin's iron plugging problem, they have been rejuvenated by removing the iron impregnated soil from the surfaces of the basin sides and bottons. This has eliminated the overflow problem temporarily by improved recharged. This work has been completed by BNL, but is considered only as an interim short-term solution.

As a first step toward the long-term solution of eliminating basin flooding and potential infiltration of present and future well fields, new recharge basins will be constructed away from potable water supply wells and down-gradient in the aquifer. The basins will also be made larger to decrease the area of influence of the recharge.

10. Details of Cost Estimate

		(Dollars in Thousands)	
		Item Cost	Total Cost
a. Architect-Engineer, design and inspection at approximately 12% of Construction Costs			$ 1,100
b. Construction Costs			9,300
Central Steam Facility		$ 2,700	
(1) General construction	$ 457		
(2) Electrical work	244		
(3) Mechanical work	563		
(4) Boiler procurement (incl. accessories)	1,218		
(5) Boiler erection	218		
Underground Steam Extension		$ 2,030	
(1) Central site area	$ 544		
(2) Warehouse area	929		
(3) Machine Shop B, Animal Quarantine and Electrical/Mech. Maintenance bldgs.	557		

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

10. Details of Cost Estimate - (continued):

		(Dollars in Thousands) Item Cost	Total Cost
Water System Improvements		4,570	
(1) One domestic water system supply well	500		
(2) Water Treatment Plant Expansion	1,070		
(3) One million gallon elevated storage tank	2,000		
(4) Recharge basins relocation	1,000		
c. Contingency at approximately 15% of above costs			$ 1,600
Total Costs			$12,000

The above contingency of $1,600,000 includes $200,000 for engineering. The additional engineering is essential because of the various design intangibles normally associated with modifying underground utilities and the planned rehabilitation work. Rehabilitation at the Water Treatment Facility includes interfacing new and improved system designs with older existing controls, instrumentation, equipment etc. Planned physical plant modification at the Central Steam Facility includes integrating the new boiler with existing equipment, fuel train and burner management systems. Past experience at Brookhaven National Laboratory indicates the strong necessity for additional engineering in this type of construction project. This project will not have a significant impact on inflation or increased costs to the private sector.

11. Major Contractor and Intended Type of Contract

Design and inspection will be performed under two (2) negotiated architect-engineer lump-sum contracts. Due to the very specialized nature of these utility improvements, single A/E firms do not usually specialize in both steam plant and water utility design work. Therefore, it is contemplated that one A/E firm be selected for the steam plant modification and underground steam main extensions and a second A/E firm be selected for the design work for the water system improvements. Construction and procurement will be accomplished by fixed-price contracts and purchase orders awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total Project Funding	Prior Yrs.	FY 1983	FY 1984	FY 1985	FY 1986	Total
1. Total Facility Costs:						
(a) Construction line item.............	$ 0	$ 260	$ 2,800	$ 7,500	$ 1,440	$12,000
(b) PE&D.............................	0	0	0	0	0	0
(c) Expense Funded Equipment...........	0	0	0	0	0	0
(d) Inventories........................	0	0	0	0	0	0
Total Facility Costs.............	$ 0	$ 260	$ 2,800	$ 7,500	$ 1,440	$12,000
2. Other Project Funding:						
(a) R&D necessary to complete construction.....................	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other project related cost........	200	0	0	0	0	200
Total Other Project Funding.....	200	0	0	0	0	200
Total Project Funding...........	$ 200	$ 260	$ 2,800	$ 7,500	$ 1,440	$12,200

B. Total Related Funding Requirement (Estimated Life of Project: 30 years)

1. Facility Operating Cost..	$ - 738
2. Programmatic Operating Expenses Directly Related to the Facility................................	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort of this Facility..	0
4. GPP or Other Construction Related to the Programmatic Effort in the Facility....................	0
5. Other Costs..	0

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding:
- (1) Total Facility:
  - (a) Construction line item - See Item 10.
  - (b) PE&D - Not applicable.
  - (c) Expense funded equipment - Not applicable.
  - (d) Inventories - Not applicable.
- (2) Other Project Funding:
  - (a) R&D - Not applicable.
  - (b) Other project related costs - Conceptual design costs total $200,000.

B. Total Related Funding Requirements:

(1) Utility Operating Costs:
After completing these improvements, the annual operating cost for these utilities is estimated as follows:

(a) Maintenance and Operations	$1,115,000
(b) Energy (utilities)	3,695,000
Total Operating Costs	$4,810,000

(2) However, if these utility improvements are not funded, the existing utility system will have a total annual operating cost as follows:

(a) Maintenance and Operations	$1,221,000
(b) Energy (utilities)	4,327,000
Total Operating Costs	$5,548,000

Therefore, it is estimated that there would be annual savings of $738,000 for these proposed utility improvements.

(3) Programmatic Operating Expense Directly Related to the Facility: Not applicable.
(4) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility: Not applicable.
(5) GPP or other Construction Related to Programmatic Effort: Not applicable.
(6) Other Costs: Not applicable.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Laboratory Emergency Response Center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 3rd Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $4,200
Less amount of PE&D: 0
Net Cost Estimate: 4,200
Date: May 1981.

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$2,000	$2,000	$2,000	$ 400
1984	2,200	2,200	2,200	1,300
1985	0	0	0	2,500

8. Brief Physical Description of Project:

This project provides for the construction of a new Laboratory Emergency Response Center (LERC) building and the installation of a data acquisition and display system, and the installation of a 100 meter meteorological tower and associated instrumentation.

The LERC will be a building of approximately 5,400 gross square feet and will house a control center, offices, training and emergency meeting room, storage and shop areas, a firearms arsenal, and sanitary facilities. The building wil be a central, multipurpose facility to provide routine and emergency monitoring of the operating facilities at the Oak Ridge National Laboratory (ORNL). The building is designed to resist an Underwriters Laboratory (U.L.) level III armed assault and includes a controlled access system and High Efficiency Particle Absorber (HEPA) filtering of the ventilation system. For aesthetic compatibility with the existing buildings in the area, the LERC will be faced with brick and limestone to match that on building 4500S.

1. Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee
2. Project No. 83-E-311

8. Brief Physical Description of Project - (continued):

The control room will include the Laboratory monitoring operator's console, security and safeguards operator's console, and the radio communications control console, as well as various miscellaneous devices. All electronic equipment not requiring operator access will be placed in an electronic equipment room, adjacent to the control room, which will also include a small electronics maintenance area.

A computer-based data acquisition system will provide continuous display of essential data on safeguards and security, environmental, meteorological, utility, process, facility radiation and contamination systems, criticality alarms, and surveillance activities.

Signals from approximately 200 field sensors will be routed to perform signal processing and multiplexing and to transmit the data via a single telephone company leased LERC data acquisition computer.

The computer system will include a minicomputer, interactive color graphics cathode ray tubes (CRT), printers, bulk memory storage, and a hard wired status display board. The system is designed to be expandable to accommodate additional inputs as required.

The meteorological tower and associated instrumentation will consist of a 100 meter tower having three levels of instrumentation, and will transmit the data via telephone lines to building 4500S. A dedicated data acquisition and processing minicomputer system is included to generate the necessary reports, perform various calculatons, and store historical data on magnetic tape. The meteorological tower will be located on Haw Ridge.

9. Purpose, Justification of Need for, and Scope of Project:

ORNL has a large potential for a major nuclear emergency as a result of its five operating reactors, processing facilities for transuranic elements and U-233 and high level waste storage. DOE - ORO Emergency Preparedness Audits of September 1977 and October 1979 along with the November 1980 Crawford Committee Report.recommended an Emergency Research Center be established. Presently ORNL has no capability in the event of a nuclear emergency to bring together in one place (1) real time data on facility radiation levels, radiation levels in steam discharges, radioactivity in the air leaving the site, and on meteorological conditions affecting direction and height of radioactivity discharges; (2) a means for displaying this data to permit

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

9. Purpose, Justification of Need for, and Scope of Project - (continued):

the most rapid and intelligent evaluation of the data by ORNL senior management in making the decisions that would be necessary to protect the Laboratory population, minimize any risk to the general public, and to affect the earliest possible containment and termination of the emergency incident; and (3) a means for rapid and orderly communications by ORNL senior management with personnel handling the emergency incident: radiation monitoring personnel: guard, fire, medical, and other emergency personnel commands; general Laboratory population; and with the DOE emergency center at the Oak Ridge Operations Office responsible for providing timely and reliable information concerning all activities at the Oak Ridge Complex (i.e., ORNL, Y-12 plant, gaseous diffusion plant, etc.) to local and state governmental agencies and to the general public. The information as discussed above is currently collected in five (5) major monitoring centers distributed throughout the ORNL facilities.

The critical need for all these capabilities in one place and ready for immediate operation was amply demonstrated in the Three Mile Island incident as documented in the Kemeny Report. The proposed Laboratory Emergency Response Center will provide a facility with capability to acquire all the required data, displaying the data for tactical control of the emergency, for all required emergency communications, and finally for protection of the emergency staff during the course of a nuclear incident at ORNL.

To ensure the constant readiness of the LERC, it will be used routinely for round-the-clock monitoring of Laboratory operations (utilities including the electrical distribution system, safeguards and security, process waste systems, etc.), as well as an alternate Laboratory communications center.

The proposed LERC will provide additional space also needed for storage of extra emergency equipment, which must now be stored in a remote location; a conference room which is situated out of the general traffic flow, since this would be the operational base for the Laboratory Emergency Review and Advisory Committee during a large-scale Laboratory emergency; an alternate fire-arms arsenal; a separate office for use by the Laboratory Emergency Planning Coordinator; and adequate parking for emergency vehicles.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

10. Details of Cost Estimate:*

a. Engineering, design, and inspection at approximately 12% of construction costs, item b			$ 465
b. Construction costs			3,100
(1) Land improvements		$ 130	
(2) Building construction (5,400 sq ft at $198/sq ft)**		1,070	
(3) Special facilities		1,390	
- Data Acquisition system (DAS) - computer field sensors, sensors, CRT terminal, dedicated cable	900		
- Safeguards and Security System	170		
- Other (e.g., HEPA filters, uninterruptible power, etc.)	320		
(4) Outside utilities		310	
(5) Other structures - meterological tower		200	
c. Standard equipment, offices furniture, and other movable equipment			100
Subtotal			3,665
d. Contingency at approximately 15% of above costs			535
Total Project Cost			$4,200

11. Method of Performance:

Design and inspection will be on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts or subconstracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

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* Based on conceptual design report completed in May 1981, at a cost of approximately $150,000.

** High cost per square foot is due to non-standard construction costs for building security purposes.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET Request

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate Old Town Area Utilities
Lawrence Berkeley Laboratory,
Berkeley, California

2. Project No. 84-ER-101

3. Date A-E work initiated: 2nd Qtr. FY 1984

5. Previous cost estimate: None
Date:

3a. Date physical construction starts: 3rd Qtr. FY 1985

6. Current cost estimate: $ 4,750
Date: 3/12/82

4. Date construction ends: 2nd Qtr. FY 1986

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1984	$ 4,750	$ 1,000	$ 1,000	$ 400
FY 1985	0	3,750	3,750	2,400
FY 1986	0	0	0	1,950

8. **Brief Physical Description of Project:**

This project consists of the rehabilitation, replacement or improvement of the aged plant utilities systems serving a multi-program array of research and development facilities in the oldest portion of the Lawrence Berkeley Laboratory. This old original area of the Laboratory which was generally constructed in the 1940's and early 50's encompasses 26 buildings with a total area of about 145,000 GSF as well as the major utilities load centers and primary distribution mains which serve this old area and peripheral shops and support facilities. Piecemeal development over several decades coupled with the super-imposition of heavy user R&D programs has resulted in overloaded, outdated and deteriorated utilities systems with inadequate reliability and flexibility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Old Town Area Utilities
Lawrence Berkeley Laboratory,
Berkeley, California

2. Project No. 84-ER-101

8. Brief Physical Description of Project - (continued):

This project will include comprehensive analysis and design to upgrade or replace selected load centers, distribution mains and components to rehabilitate the following utilities systems.

- Water service; domestic, industrial and low conductivity systems including new cooling towers, lift pumps, circulating pumps and demineralizers, instruments and controls. About 3000 lineal feet of pipe (various sizes) will be replaced or relocated along with valves, hydrants and control stations.
- Compressed air service; about 4800 lineal feet (various sizes) will be replaced or relocated along with valves, control stations and a standby air compressor control system.
- Natural gas service; about 2600 lineal feet will be replaced or relocated. New pressure reducing stations, meters, earthquake shut-off valves and vaults will be included.
- Electrical service; about 800 lineal feet of primary and secondary low voltage and high voltage distribution will be replaced or relocated along with two sub-stations with transformers and switch gear, manholes, conduit, new motor control centers and energy monitoring and control systems components. One new centrally located standby generator will replace five old unreliable army surplus generators and provide peak shaving capacity to reduce demand costs.
- Communications service; including new duct banks, conduits and manholes for telephones, public address, fire alarm and energy monitoring and control systems.
- Sanitary sewerage; about 3820 lineal feet (various sizes) will be replaced or relocated.
- Storm sewerage; about 2800 lineal feet (various sizes) will be replaced or relocated.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Old Town Area Utilities
Lawrence Berkeley Laboratory,
Berkeley, California

2. Project No. 84-ER-101

8. Brief Physical Description of Project - (continued):

Generally, rehabilitation will provide improved flexibility, capacity, reliability and backup and reduce energy use and maintenance costs. An important feature of the project will involve consolidating main runs of various utilities into a new utilities and service road corridor through the "Old Town" area. This corridor will provide optimum accessibility for utilities maintenance, modification and program flexibility as well as a badly needed thoroughfare to improve traffic circulation and reduce safety hazards.

The conceptual design for this project is consistent with the proposed redevelopment plan for the "Old Town" area which is the keystone of LBL's long range development plan.

9. Purpose, Justification of Need and Scope of Project

The old original area of the Laboratory which was developed during a 10 year period which began about 40 years ago includes 26 buildings with heavy and light laboratories, shops, and high bay facilities which are intensely used for multiprogram research and development. A number of these programs also provide vital single source technology and development support for national research programs at other DOE installations. This area of the LBL site is also the prime functional and physical location for future utilization of the Laboratory's scientific resources. Due primarily to age, the existing utilities systems in "Old Town" are in an advanced state of deterioration; corroded, overloaded and unreliable with inadequate flexibility to handle varying programmatic demands. Many components of the electrical systems date back well before the Lawrence Laboratory began. Many were originally acquired from army surplus. Currently, utilities breakdowns, systems leaks and service problems plague research schedules and place heavy demands on LBL's Plant Maintenance resources. Frequently, natural gas leaks, power problems, corroded waste lines and antiquated components of these systems cause serious safety problems for operations personnel and pose environmental hazards. Rehabilitation is urgently required to avoid serious disruption to R&D schedules and to mitigate safety and environmental hazards.

The Magnetic Fusion Energy (MFE) and Biomedical Programs must depend on the "Old Town" Utilities systems for their continued accomplishment. These programs are funded at approximately $15M per year and require the direct utilization of approximately 150 scientific and support personnel. An added dimension to the support picture for "Old Town" area of LBL utilities is that major Magnetic Fusion Energy (MFE) projects at Lawrence Livermore National Laboratory (LLNL), Princeton Plasma Physics Laboratory and General Atomics are dependent upon work on neutral beams conducted in the "Old Town" area. These projects are the Mirror Fusion Test Facility at LLNL, the Tokamak Fusion Test Reactor at PPPL, and the Doublet III at General Atomic.

Annual operating costs upon completion of this project are expected to total $60,000, about $15,000 for maintenance and $45,000 for energy. This represents a decrease of $100,000 in annual maintenance costs and $20,000 in annual energy costs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Old Town Area Utilities
Lawrence Berkeley Laboratory,
Berkeley, California

2. Project No. 84-ER-101

10. Details of Cost Estimate:*

A. Engineering, Design and Inspection at about 15% of Construction Cost		$ 560
B. Construction Costs:		3,760
1. Site work (Civil)	$ 570	
2. Site Utilities	1,540	
3. Mechanical Utilities	410	
4. Electrical Utilities	1,240	
Subtotal		4,320
C. Contingencies at about 10% (of which $376,000 is for construction)		430
Total Estimated Cost		$ 4,750

11. Methods of Performance:

Engineering design will be performed under a negotiated Architect/Engineer subcontract. Inspection and some engineering will be done by LBL personnel. Construction and procurement will be accomplished by fixed price subcontracts awarded on the basis of competitive bids.

12. Funding Schedule:

Not required because the total estimated cost of this project is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required because the total estimated cost of this project is less than $5,000,000.

* Estimate is based on completed Conceptual Design.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Cooling water facilities restoration, Oak Ridge National Laboratory, Tennessee

2. Project No. 84-ER-102

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1985

4. Date construction ends: 4nd Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 4,000
Date: April 1982

7. **Financial Schedule:**

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1984	$ 4,000	$ 600	$ 600	$ 300
FY 1985	0	3,400	3,400	2,000
FY 1986	0	0	0	1,700

8. **Brief Physical Description of Project:**

The project will provide for restoration of a 38-year-old cooling system presently serving Oak Ridge National Laboratory (ORNL) research buildings in the Y-12 Plant area. These buildings contain Fusion Energy Division research and development experiments, Engineering Technology Division facilities in support of fission reactor development and safety programs, and the ORNL Isotope Separation Operations. The existing cooling tower with extended coil shed will be demolished and removed from the existing cooling tower basin. A new multi-cell cooling tower will be added on the existing tower basin and any excess basin area will be covered with span decking. The work will include separate high and low pressure demineralized heat exchangers. Some of the piping serving the tower will be refurbished or replaced. Structural modifications will be required to the existing foundations to make them compatible with the new tower. Underground electrical power and control service to the tower and pumphouse will be provided as well as fire protection.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Cooling water facilities restoration, Oak Ridge National Laboratory, Tennessee

2. Project No. 84-ER-102

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to provide for restoration and refurnishment of the existing, inadequate and unreliable cooling water system presently serving ORNL Multi-Program Research within building 9201-2 at the Y-12 Plant.

ORNL facilities located in Building 9201-2 in the Y-12 Plant were constructed in the early 1940's to house electromagnetic separation equipment. Since 1959, these facilities have undergone extensive and numerous internal renovations and modifications to make them functional for their changing application in support of multiple programs of ORNL. Currently, three major divisions of the Laboratory have exclusive use of these facilities for key programs which are central to the mission of ORNL as a major contributor to energy-related research. In terms of floor space, no one program dominates and all presently contemplated uses of these facilities continue to be multi-programmatic.

The cooling water utilities system currently serving the ORNL research facilities in Building 9201-2 is operating at only 30% of the systems initial capability. With this limitation the system's present cooling capacity is 15MW thermal. The current operating load is 22 MW thermal. To compensate for this shortfall of 7 MW the Fusion Energy, Engineering Technology, and Isotope Seperation Programs are restricted to operation on a selective scheduling basis. The requirement for selective scheduling coupled with increased system down time for maintenance is seriously restricting operation of these facilities. The significance of the maintenance effort for this system is evidenced by the cost. In 1981 maintenance costs exceeded $200,000 and are projected to reach $300,000 for 1982. In addition to these costs the structural deterioration of the cooling tower has created hazardous working conditions for maintenance personnel.

10. Details of Cost Estimate:*

a. Engineering, design, and inspection at approximately 12% of construction costs, item b.		$ 375
b. Construction costs..........		3,150
(1) Other structures..........	$ 3,150	
Subtotal..........		3,525
c. Contingency at approximately 13% of above costs..........		475
Total Project Cost..........		$ 4,000

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* Costs are extracted from the Conceptual Engineering Design prepared by Burns & Roe Industrial Services, Inc., and as adjusted by UCC-ND Engineering.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Cooling water facilities restoration, Oak Ridge National Laboratory, Tennessee

2. Project No. 84-ER-102

11. **Method of Performance:**

Design and inspection will be based on a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price prime contract awarded on the basis of competitive bidding.

12. **Funding Schedule for Project Funding and Other Related Funding Requirements:**

Not required because the total estimated cost of this project is less than $5,000,000.

13. **Narrative Explanation of Total Project Funding and Other Related Funding Requirements:**

Not required because the total estimated cost of this project is less than $5,000,000.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL)

2. Project No. 84-ER-103

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 4th Qtr. FY 1984

4. Date construction ends: 1st Qtr. FY 1987

5. Previous cost estimate: None
Date: June 1982

6. Current cost estimate: $16,000
Less amount of PE&D: 0
Net Cost Estimate: $16,000
Date: August 1982

7. **Financial Schedule:**

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1984	$ 16,000	$ 3,000	$ 3,000	$ 1,000
FY 1985	0	4,500	4,500	3,600
FY 1986	0	8,500	8,500	4,600
FY 1987	0	0	0	4,800
FY 1988	0	0	0	2,000

8. **Brief Physical Description of Project:**

This project is for the restoration, widening, and improvement of roads at various sites to improve traffic safety and bring these roads into conformance with current standards and practices in highway construction. Brief descriptions of each component, by site, follows:

A. Traffic Safety Improvements, Route 4, Richland, Washington - Approximately six miles of Route 4, the arterial road servicing the Hanford area, will be improved to be more consistent with Washington State highway design guidelines. Each lane will be widened approximately 2 feet to provide standard 12-foot lanes. Shoulder surfaces will be treated and widened to provide the standard design width. Acceleration, deceleration, and holding lanes will be provided where required.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL) 2. Project No. 84-ER-103

8. Brief Physical Description of Project - (continued):

Safety hazards such as poles, fire hydrants, and telephone cable boxes will be removed or relocated as required. Appropriate traffic control devices, lane markers, guard rails, roadway signs, pavement markings, and crash protection will be provided as necessary. The road shall be resurfaced with an asphalt overlay to eliminate the cracked and uneven places and to match and blend with the additions proposed by this project. The intended useful life of this project is 25 years.

B. INEL Road Refurbishment, Idaho National Engineering Laboratory (INEL), Idaho - This project provides for restoring approximately 37 miles of INEL primary and secondary roads to a safe and reliable condition. The project design will provide an engineered road cross section meeting traffic density and load requirements. Since this is not a total reconstruction project, the repair methods will vary from applying an asphaltic leveling course on the existing surface to demolishing and reconstructing the total road cross section. The work method selected will depend on conditions along the route of each section to be restored. The completed roads will have painted traffic striping, proper crown, adequate surface-thickness, engineered base-course, compacted subgrade and side drainage.

C. Roadwork Project - Safety Program, Lawrence Berkeley Laboratory (LBL), Berkeley, California
This project provides for increasing the radius of curves at various intersections and widening of the main access road to the Laboratory. Vertical and horizontal curves will be removed and roads realigned to conform to the Department of Transportation Highway Design Standard. Included will be separation of pedestrian and vehicular traffic in some areas of the complex.

D. Repair Existing Roads, Argonne Natinal Laboratory (ANL), Argonne, Illinois - This project will reconstruct approximately 10 miles of roadway serving the ANL-East Laboratory site. Included in this reconstruction effort are the main entrance routes to the site and those roads serving the principal permanent buildings and facilities. Roads serving buildings that are to be deactivated will not be reconstructed.

Work to be performed includes:

a. Repair of base course failures
b. Resurfacing with 2 1/2 inch bituminous concrete topping
c. Rework and repair of road shoulders
d. Raising existing manholes to match new road alterations
e. Restriping of traffic lanes and crosswalks
f. Replacement of deteriorated culvert pipes

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL)

2. Project No. 84-ER-103

9. Purpose, Justification of Need for, and Scope of Project:

A. Traffic Safety Improvements, Route 4, Richland, Washington - Route 4 is the arterial servicing the Hanford Site. This roadway was built in 1943 prior to formalization of national policies on highway design. Lack of conformance to current highway design guidelines has created serious traffic hazards on the Hanford Site. In addition, Route 4 has deteriorated over the years. The road surface is cracked and uneven, lanes are narrow, and in most places the shoulders are soft, narrow and rutted. The existing lanes are only 10 feet wide, 2 feet narrower than required by current standards. The 10-foot lanes allow very little maneuvering room, and create heavy traffic loads along the road edge. This stress causes pavement edge break-up and hence further reduction of lane width, and deep ruts in the shoulders. These factors have caused increased maintenance and safety problems. This project proposes to improve that portion of Route 4 from the 1100 Area to the gravel pit, a distance of approximately 6 miles. This area carries the greatest amount of traffic and has the highest accident rate.

B. INEL Road Refurbishment, Idaho National Engineering Laboratory (INEL), Idaho - The roads proposed for reconstruction are the sole access to active INEL Facility areas. They have been maintained in continuous use since their original construction during the 1950's and 1960's. Maintenance efforts since that time have included patching, seal coating and surface overlays. Deterioration in the base course and subgrade has progressed to the point that these efforts provide only short term improvement. In addition, pavement edge-breakage has narrowed the road in some sections to less than the minimum required for safe two-lane operation. The current situation has resulted from combinations of the following circumstances:

- Existing roads that were not designed for current traffic density and loads which have led to continuing surface and subsurface breakdown.
- Extreme winter cold temperatures ranging to -40°F causing surface course brittleness and shrinkage leading to extensive cracking, subsequent moisture penetration and subsurface failure.
- High summer temperatures ranging to 100°F causing road weakness in areas of minimum road stability. This results in ruts, depressions and washboards on the road surface.
- Moisture entry through surface cracks and unpaved shoulders. This causes reduced subsurface support strength and surface breaking.
- Frost heave caused by soil capillarity and poor drainage during winter weather. This results in both surface breakup and subsurface failure.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL)
2. Project No. 84-ER-103

9. Purpose, Justification of Need for, and Scope of Project - (continued):

C. Road Project - Safety Program, Lawrence Berkeley (LBL), Berkeley, California - The existing radius of the curves of the main access road to the laboratory are such that semi-trailers are found to go over the road center line. In some areas of the laboratory pedestrians and vehicles must use the same road way.

Improvement of the laboratory roading and pedestrian systems are required to bring the old substandard roads and sidewalks in the hilly LBL terrain up to acceptable code and safety standards by improving alignment sight distance, removing horizontal and vertical curves, increasing the radius of curves and widening the access road to the site.

D. Repair Existing Roads, Phase I, Argonne National Laboratory (ANL), Argonne, Illinois - The site roads are deteriorating at a faster rate than they can be economically repaired. This deterioration reflects the age of the roads, approximately 30 years, and the severity of the climate at the ANL-East site. Failing road edges, the result of base course failures and late winter thaws, cannot be corrected by patching methods. The use of operating funds in an attempt to maintain the roadways in serviceable condition has resulted in unsatisfactory road conditions at best, and a heavy drain on the Laboratory's resources.

A full reconstruction program for those sections of the roadway network which are in worst condition will be provided by this project.

10. Details of Cost Estimate:*

	Richland	INEL	LBL	ANL	Total
a. Engineering and Design and Inspection	$ 530	$ 535	$ 165	$ 200	$ 1,430
b. Construction Costs	3,840	6,110	1,045	1,600	12,595
Subtotal	4,370	6,645	1,210	1,800	14,025
c. Contingency	630	955	190	200	1,975
Total Project Cost	$ 5,000	$ 7,600	$ 1,400	$ 2,000	$16,000

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* Conceptual Design Reports completed.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
In-house Energy Management
Management and Administration
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

In-house Energy Management (MA)	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Surveys and Central Plant Studies:				
Operating Expenses.........	$ 3,900	$ 500	$ 500	$ 1,200
Subtotal...............	3,900	500	500	1,200
Modifications for Energy Management, Various Locations:				
Construction...............	14,100	13,500	13,500	11,500
Subtotal...............	14,100	13,500	13,500	11,500
Energy Monitoring & Control System, Y-12 Plant:				
Construction...............	2,500	0	0	0
Subtotal...............	2,500	0	0	0
Alternate Energy Source, Pantex Plant				
Construction...............	1,000	0	0	0
Subtotal.................	1,000	0	0	0
High Temperature Water Distribution System, Los Alamos National Laboratory:				
Construction...............	2,100	2,000	2,000	1,700
Subtotal...............	2,100	2,000	2,000	1,700
Total				
Operation Expenses..............	3,900	500	500	1,200
Construction....................	19,700	15,500	15,500	13,200
In-house Energy Management....	$23,600	$16,000	$16,000	$14,400

Authorization Section 102(a), P.L. 95-238

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL) 2. Project No. 84-ER-103

11. Method of Performance:

A. RL Subproject - Design and inspection will be accomplished by a negotiated architect-engineering contract or the on-site architect-engineer firm. The major portion of the construction will be accomplished under fixed-price contracts awarded on the basis of competitive bids. Relocation of any power or utility poles will be accomplished through negotiations with the appropriate utility.

B. INEL Subproject - Overall responsibilities for design and construction will be assigned to the INEL prime contractors administered by DOE-ID. The INEL contractor will provide technical direction of the design effort. Construction will be accomplished by fixed price subcontracts awarded on the basis of competitive bidding.

C. LBL Subproject - Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontract awarded on the basis of competitive bidding.

D. ANL Subproject - Engineering, design and inspection will be performed by Laboratory engineering personnel. Construction will be accomplished by fixed-price contract awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding							
(1) Total facility costs							
(a) Construction line item	$ 0	$ 1,000	$ 3,600	$ 4,600	$ 4,800	$ 2,000	$16,000
(b) PE&D........................	0	0	0	0	0	0	0
(c) Expense funded equipment.....	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	$ 0	$ 1,000	$ 3,600	$ 4,600	$ 4,800	$ 2,000	$16,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL) 2. Project No. 84-ER-103

12. Funding Schedule of Project Funding and Other Related Funding Requirements - (continued):

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
(2) Other project funding							
(a) R&D necessary to complete construction ..	$ 30	$ 0	$ 0	$ 0	$ 0	$ 0	$ 30
(b) Other project related costs	0	0	0	0	0	0	0
Total other project funding	30	0	0	0	0	0	0
Total project funding (1 and 2)	$ 30	$ 1,000	$ 3,600	$ 4,600	$ 4,800	$ 2,000	$16,030

	Annual Cost
b. Total other related funding requirements (estimated life of project: 25 years)	
(1) Facility operating costs	$ 50
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	$ 50

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total Project Funding:
   1) Total Facility:
      a) Construction Line Item
      b) PE&D - No PE&D required.
      c) Expense Funded Equipment - There is no expense funded equipment.
      d) Inventories - There are no inventories required.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road Repair, various locations (ANL, INEL, LBL, RL)

2. Project No. 84-ER-103

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements - (continued):

2) Other Project Funding:
   a) Research and Development is not necessary for this project. The amount shown covers conceptual design activities.
   b) Other Project Related Costs - No other project related costs are anticipated.

b. Total Related Funding Requirements:
   1) These costs are the average maintenance cost of roads at the various sites. They are based on a cost per square foot of new surface escalated to 1987.
   2) Programmatic Operating Expenses - None
   3) Capital Equipment not Related to Construction - None
   4) GPP or Other Construction Related to Programmatic Effort - No GPP funds are required by this project
   5) Other Costs - No other costs are anticipated

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Facilities Support Projects, Various Locations

2. Project No. 84-ER-104

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 4.000
Less amount of PE&D: 0
Net Cost Estimate: $ 4,000
Date: June 1982

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1984	$ 4,000	$ 4,000	$ 4,000	$ 1,000
FY 1985	0	0	0	3,000

8. Brief Physical Description of Project

This is an annual request to undertake a variety of construction projects, each of an intermediate size (from $1,000,000 to $2,000,000), that are needed to maintain the adequacy of multiprogram general purpose facilities at Multiprogram Laboratories. This project is the result of a continuing study of the facilities at these laboratories.

The 1981 facilities inventory identified a backlog of facilities deficiencies at these laboratories of over $2,000,000,000. Proposed projects to correct these deficiencies range in size from less than $100,000 to over $20,000,000. This project addresses the intermediate sized projects that range from $1,000,000 up to $2,000,000. Such projects are too large for traditional General Plant Project (GPP) funding, yet are too small in size and too many in number to be afforded line-item status on their own. The size of this project is consistent with the extent of the backlog of projects in this size category and the overall MGPF request. The suggested approach to selecting projects is flexible and assures that the highest priority projects are funded across these laboratories.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Facility Support Projects, Various Locations 2. Project No. 84-ER-104

9. Purpose, Justification of Need for, and Scope of Project

The following are examples of projects under consideration for accomplishment with FY 1984 funds. The cost estimates are preliminary and serve to indicate the magnitude and nature of the individual project activities. Additional items bearing a higher priority may be added to the list with the resultant delay in some of the projects listed. These changes will depend upon conditions or situations not yet apparent or easily predicted. All projects meet the requirements of the MGPF program and are between $1,000,000 to $2,000,000.

1. Firehouse/BNL - TEC $1,800,000 - A new 10,000 sf firehouse with four drive-through truck bays will replace an existing World War II wood firehouse of 6,700 sf, a 200 sf trailer, temporary storage sheds, and three offices (about 600 sf) in another wood building located two miles away. The new building will accommodate recently acquired longer and wider diesel equipment, provide required shops and clean room, and space for life safety equipment maintenance. The building will be located in a much better location at the intersection of two major road arteries with truck entry on to a less traveled road. Steam, sanitary sewer and power will be extended from existing networks. The present temporary structures will be demolished.

2. Improvements to Existing Sewage Plant, ORNL - TEC $1,200,000 - This project will refurnish ORNL's sewage treatment system to satisfy requirements of the current National Polluntant Discharge Elimination System (NPDES) permit in accordance with the Clean Water Act Amendments of 1977. At ORNL from 1979 thru 1981, 269 non-compliances with the NPDES permit have occurred. The majority of these non-compliances are due to (1) the flow through the plant is exceeding design capacity by approximately 110,000 gallons per day; (2) 100,000 GP of this flow comes from non-sanitary waste water (sewer system evaluation study, September 1980); (3) existing aerobic system is inadequate; and (4) lagoon liners and dikes have deteriorated. To minimize these deficiencies the project will include the following:

   (1) Replacement of approximately 2,000 feet of sewer pipe, re-routing of approximately 2,000 feet of pipe, and installation of manholes as required.
   (2) A new aeration system to inhibit aquatic plant growth and increase sewage treatment capability by increasing oxygen availability and effectiveness of chlorine disinfection.
   (3) Corrective actions to assure integrity of lagoon liners and dikes.

3. Rehabilitation of Water and Waste Treatment System, ANL - TEC $1,000,000 - The work at the Waste Treatment Plant includes new pressure filters, replacement of lines for sanitary and laboratory water waste collection tanks, replacement of sludge pumps, replacement of filter intake screens, and replacement of four low lift and high lift water pumps. The plant, which serves the entire site, is over 30 years old and deterioration due to age and utilization requires selective replacement. Effective operation is closely monitored by the Illinois EPA and the effluent must satisfy strict requirements.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Facility Support Projects, Various Locations 2. Project No. 84-ER-104

10. Details of Cost Estimates

See description, item 9, the estimates are preliminary and, in general, indicate the magnitude of each project the costs include engineering, design and inspection and contingency.

11. Method of Performance

Design, engineering, major procurement, construction, inspection and program administration will be accomplished by the operating contractor either in-house or by contracting with local Architectural/Engineering firms. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and purchase orders awarded on the basis of competitive bidding.

12. Funding Schedule for Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
IN-HOUSE ENERGY MANAGEMENT
(In thousands of dollars)

FY 1983 Appropriation enacted	$16,000
Built in increases and decreases:	
None	0
FY 1984 base	$16,000
Program Increases and Decreases:	
o Increase Energy Conservation Surveys	+ 700
o Decrease Modifications for Energy Management, Various locations	-2,000
o Decrease High Temperature Water Distribution System, LANL	- 300
FY 1984 Budget Request	$14,400

In-house Energy Management

The FY 1984 budget request for the In-house Energy Management Program is $14,400,000, a $1,600,000 decrease from the amount budgeted in FY 1983.

The requested amount reflects a continuing emphasis on energy conservation through retrofit construction projects. Major program objectives are to: (1) reduce energy consumption per square foot by 20 percent in all Department buildings by 1985 from a 1975 baseline as required by Executive Order 12003; (2) retrofit all Department buildings with cost-effective energy conservation retrofits by 1990 as required by the National Energy Conservation Policy Act of 1978 (P.L. 95-619). Specific program elements consist of:

- surveys of existing buildings and systems to identify cost effective energy retrofit projects; and
- retrofit construction projects that improve the energy efficiency of systems and buildings at various field sites

This year's proposed funding level will further approach the established energy-saving outlined in Executive Order 12003 and the National Energy Conservation Policy Act of 1978 (P.L. 95-619). The continuation of energy conservation surveys will allow the identification of candidate facilities that can be economically retrofitted in future years to produce maximum energy savings. The retrofit projects, as well as the associated surveys are vehicles for accomplishment of legislative and Presidential goals integral to the Federal energy management effort.

Investments in retrofit projects proposed in FY 1984 will result in an annual savings of 315,000 barrels of oil equivalent and have an average payback of 1.9 years resulting in a 35 percent internal rate of return on investment.

The following is a summary of the projects:

	1983	1984
Energy Conservation Surveys and Central Plant Studies................	$ 500	$1,200

Operating funds are required to conduct energy conservation surveys of existing buildings and systems to identify and document retrofit projects to reduce energy consumption. These surveys will accomplish the necessary engineering investigations to document energy savings resulting from a proposed project, address life cycle costing to assure project cost-effectiveness, and produce cost estimates and budget documents for the proposed project. This will identify projects at various DOE-owned facilities for future funding.

	1983	1984
Modifications for Energy Management, Various Locations..............	$13,500	$11,500

This line item is for various small retrofit projects of less than $1,000,000 in scope. These small modifications are selected on the basis of return on investment. Projects compete on a DOE-wide basis for funding, thus assuring the greatest dollar return and greatest energy savings per investment dollar for the Department. These projects will save 240,000 equivalent barrels of fuel oil annually and have an average payback of 1.8 years or an internal rate of return of 38 percent.

	1983	1984
High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico..	$2,000	$1,700

This project provides for the construction of a central high temperature water (HTW) heating system in the main technical area (TA-3) of the Los Alamos National Laboratory. This new HTW heating system will replace the entire TA-3 branch of the existing steam distribution system. The existing power plant provides space heating and electricity through cogeneration. Included in this project are: steam to HTW heat exchangers for the power house; circulating pumps and a pump house; two condensate return pumps; inert gas pressurization equipment; and a HTW heating system supervisory control center. Investment in the proposed project has a payback of 3.3 years resulting in an internal rate of return of 33 percent and saves 75,000 equivalent barrels of fuel oil annually.

DEPARTMENT OF ENERGY
FY 1984 Congressional Budget Request

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Modifications for energy management, various locations

2. Project No. 84-A-601

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3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $11,500
Date: 10/82

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7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$11,500	$11,500	$11,500	$2,300
1985				$4,000
1986				$4,000
1987				$1,200

8. Brief Physical Description of Project

This line item is for various small retrofit projects to reduce energy consumption. These small modifications will be selected on the basis of return on investment and energy savings. Projects compete on a DOE-wide basis for funding under this lump sum item, thus assuring the greatest return and greatest energy savings per investment dollar for the Department. The average payback for this line item is about 1.8 years.

9. Purpose, Justification of Need For, and Scope of Project:

Approximately 50 of the most economical projects will be funded. The projects range from less than $5,000 to $1,000,000. The Projects are for HVAC modifications, insulation of buildings, waste heat recovery, installation of more efficient lighting, steam line modifications, power factor improvements, etc. The small payback projects selected for this line item have the following total effect:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Modifications for energy management, various locations

2. Project No. 84-A-601

9. Purpose, Justification of Need For, and Scope of Project: (continued)

Average Internal Rate of Return	38 percent
Average Savings to Investment Ratio	10.7
Average Discounted Payback Period	1.8 years
Total Annual Energy Savings	1,400 Billion BTUs
Annual Cost Savings (82 dollars)	$5,730,000

10. Details of Cost Estimate:

There are approximately 50 projects each with a total estimated cost (TEC) less than $1,000,000, which will be funded by this line item. The projects will be selected on the basis of return on investment and energy savings.

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

Department of Energy
FY 1984 Congressional Budget Request

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 3rd Qtr. FY 1986

5. Previous cost estimate: $10,450
Date: 6/80

6. Current cost estimate: $10,500
Date: 1/82

7. **Financial Schedule:**

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$2,100	$2,100	$ 570	$ 120
1983	2,000	2,000	3,530	2,880
1984	1,700	1,700	1,700	2,550
1985	4,700	4,700	4,700	2,725
1986				2,225

8. **Brief Physical Description of Project:**

This project provides for the construction of a central high temperature water (HTW) heating system in the main technical area (TA-3) of the Los Alamos National Laboratory (LANL). This new HTW heating system will replace the entire TA-3 branch of the existing steam distribution system which is 27 years old and in a state of extreme deterioration. The existing TA-3 power plant will continue to use natural gas to cogenerate electric power and steam for space heating. Included in this project are: steam-to-HTW heat exchangers to be located in the existing power plant; a new circulation pump house to be built just south of the power plant housing three distribution pumps; two condensate return pumps; inert gas pressurization equipment for corrosion protection; and a HTW heating system supervisory control center. Approximately seven miles of HTW supply and return distribution piping will be required. Domestic water heaters will be replaced and conversion of steam to HTW will be made within each of the 35 buildings before the existing steam distribution system is abandoned.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

8. Brief Physical Description of Project: (continued)

The townsite branch of the steam system now has two DOE facilities on it, the Los Alamos Area Office (LAAO) and the Health Research Laboratory (HRL) which will receive individual heating systems as part of this project. It was determined not cost effective nor energy efficient to transmit HTW for the long distance required to convert the townsite branch of the steam system. The remaining townsite branch users, all non-DOE facilities and not a part of this project, are the high school, hospital, post office, library, the county municipal office building, a community lodge, and 22 apartment buildings. The following alternatives are apparent for these facilities:

a. Non-DOE users assume operation of an existing inefficient standby steam plant near the townsite, continue to use steam for heating, and purchase fuel from either the Department or the county.

b. Remove or abandon in place the townsite branch steam line. The non-DOE users would install their own heating equipment as required.

Non-DOE facilities, users and owners, have been put on notice of pending termination of steam services. Sufficient time will be allowed to enable them to convert to other sources of heat prior to termination of steam service. It is expected that the rapidly escalating price of steam would eventually force the customers to convert to other more economical sources of heat.

Improvements to the land will be limited to restoration of construction areas such as trenches, landscaping, curb, gutter, sidewalks and street patching.

9. Purpose, Justification of Need For, and Scope of Project:

The existing steam distribution system is in poor condition due to age, insulation deterioration and corrosion damage. The conceptual design report and energy analysis shows a new HTW heating system would have a lower capital cost than replacement of the existing steam system; also a considerable reduction in natural gas consumption will be realized with a new HTW

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High Temperature Water Distribution System,
Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

9. Purpose, Justification of Need For, and Scope of Project: (continued)

distribution system. The low payback period of 3.3 years for the new system is due to the heavy thermal losses in the existing steam distribution system. This payback period was calculated using a life-cycle costing method utilizing a 7 percent discount rate, a 25 year life, and considering all costs. Comparing the systems only, the project provides the following energy savings and economic return:

Internal Rate of Return	33 percent
Savings to Investment Ratio	5.45
Discounted Payback Period	3.3 years
Annual Energy Savings	434,000 Million BTUs
Annual Cost Savings (FY 82 dollars)	$2,116,000

10. Details of Cost Estimate:*

	Item Cost	Total Cost
a. Engineering, design and inspection at about 15 percent of Item b		$1,140
b. Construction Costs		$7,610
(1) Improvements to land	$ 215	
(2) Buildings	$2,740	
(3) Utilities	$4,655	
Subtotal		$8,750
c. Contingency at about 20 percent		$1,750
Total Project cost		$10,500

*The estimate is based upon conceptual design.

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Technical Information Services

The goal of the Technical Information Services Program (TISP) is to ensure effective and efficient management, control, and use of the results of Department-funded research and development. Management and control activities assure that the Department receives the products it has contracted for, that classified and sensitive materials are handled in a responsible and consistent manner, and that publication production and distribution are carried out by the most cost-effective means.

The TISP also assures that DOE scientists, engineers, and program managers have effective access to worldwide developments in energy science and technology through the availability of the information resulting from R&D throughout the world. Ensuring timely availability and effective use of this information in decisionmaking by DOE program managers and contractors prevents costly duplication and undesirable gaps in the Department's R&D program, increases scientific productivity, and assures that scarce research dollars are used to their full potential by research programs.

The methods employed to accomplish program goals include the establishment of information policy and program overview and assessment to ensure that all offices within DOE have effective technical information support; administrative evaluation and control of all Department R&D publications; technical analysis and categorization of this material for future use; development and maintenance of data bases and retrieval systems to provide effective access to the technical and administrative aspects of these publications; management of publishing, distribution, and report announcement activities to assure effective dissemination of research results for the Department and its contractors; and development and application of new information technologies to facilitate resource sharing.

FY 1983 Accomplishments Include:

- Continued support of research program productivity by adding 200,000 new research project descriptions to the Energy Data Base (EDB) bringing the total to over 1.7 million items. Additionally, over 100,000 items of interest to nuclear programs from pre-1976 Nuclear Science Abstracts were added. The 1.8 million references represent the results of worldwide R&D investment of over $170 billion which has been shown to provide R&D information to DOE researchers that has resulted in an annual savings of over $3.6 billion in time, equipment, and materials.

- Maintained an international information program that is consistent with Administration policies to ensure control of outflow of sensitive technology and the increased availability of foreign energy information which is used in intelligence activities as well as to increase research productivity (100,000 foreign publications received).

- Supported the development of Department-wide procedures and systems for handling sensitive data consistent with Section 148 of Amendments to the Atomic Energy Act (P.L. 97-90) and implementation of recent executive orders.

- Continued upgrade of the Department's classified information system and support for Defense Programs by full implementation of a stand-alone classified computer system to enhance weapons information maintenance and retrievability.

- Produced specialized services to aid R&D management including 11 specialized bibliographies on nuclear waste, 5 monthly current awareness journals, 9 semimonthly current awareness bulletins, and published special DOE monographs and symposia on behalf of DOE program offices.

- Implemented a fully integrated on-line Technical Information Monitoring System (TIMS) linked to both an integrated, comprehensive DOE research-in-progress data base and data bases containing the technical publications resulting from DOE-funded R&D.

- Managed and operated a centralized, cost-effective publication distribution and control program for DOE technical reports ensuring efficient access by DOE's 60,000 scientists and engineers consistent with the goals of P.L. 96-511.

- Converted to a partial cost recovery operation the management of computer software sharing within the Department which provides a centralized software inventory with a cumulative investment of over $255 million that saves DOE over $200 million a year in preventing duplicative development costs.

Specific Objectives for FY 1984 to FY 1987 are:

- Manage and control the results of the Department's multibillion dollar investment in energy R&D so that the access to unclassified and unlimited results of federal energy R&D is facilitated while protection of classified and sensitive data in the interest of national security is assured.

- Continue to maintain the world's most comprehensive information resource on energy science and technology to support the progress and productivity of long-term energy R&D program of the federal government.

- Maintain the U.S. leadership position and fulfill national commitments to international energy agencies, particularly in support of nuclear nonproliferation and safeguards goals, through information exchange agreements.

- Continue to develop specialized products and services for the Department's 60,000 program managers, scientists, and engineers to help increase their work efficiency and productivity.

- Introduce new technologies to improve internal production efficiencies and to improve accessibility and timeliness of information available for technical decisionmaking by emphasizing networking, information resource sharing, and numeric data resources.

- Continue to support DOE implementation of Stevenson-Wydler Act (P.L. 96-480) by creating a computerized access system for technology transfer tools including the production of 200 energygrams to transfer DOE-developed technology to U.S. industry.

- Implement interagency network development program with other science agencies to facilitate scientific information resource sharing for the results of more than $36 billion invested in 1983 federal R&D programs.

Accomplishment of the objectives of the centralized Technical Information Services Program is consistent with the Department's responsibilities regarding control, protection, and access to scientific and technical information as stated in 42 U.S.C. 7112, 7151, and 9703, Public Law 97-90, Sec. 148, and recent Executive Orders on national security information.

Technical Information Center
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - OPERATING EXPENSES
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
(in Thousands of Dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Technical Information Services (MA)				
Operating Expenses	$14,526	$14,103	$14,356	$13,300
Plant and Capital Equipment	1,300	1,150	1,150	800
Total Technical Information Svcs.	$15,826	$15,253	$15,506	$14,100
FTP/Total FTE's	193/219	157/167	157/167	160/170

Authorization: Section 102, P.L. 95-91 & Section 141, Atomic Energy Act of 1954

Summary of Changes
Energy Supply Research and Development
(Dollars in Thousands)

FY 1983 Appropriation	$15,253
Built-In Increases:	
Pay Cost Supplemental	+205
Increase in Medicare Benefits	+ 48
FY 1984 Base	$15,506
Program Decreases	
• Termination of all direct funding to support the DOE/NRC computer software sharing facility at Argonne National Laboratory	-250
• Termination of the operation of DOE's central document registry and control system for public educational materials and the centralized DOE program to respond to energy inquiries from the public	-600
• Delay development of new technology such as computer networking to promote interagency resource sharing which would improve federal R&D productivity	-206
• Delay of computer and systems upgrade and on-line storage capacity for systems designed to process classified information, support DOE RECON, and upgrade office automation and internal technology utilization	-350
Subtotal	1,406
FY 1984 Budget Request	$14,100

Department of Energy

FY 1984 CONGRESSIONAL BUDGET
NARRATIVE

Technical Information Services

The FY 1984 budget request for the Technical Information Services Program (TISP) is $14,100,000, including $13,300,000 operating expenses (OE) and $800,000 capital equipment (CE). The $14,100,000 is a decrease of $1,153,000 under the base FY 1983 program of $15,253,000. Full-time equivalent (FTE) positions requested for FY 1984 are 170 (160 full-time permanent and 10 other than full-time permanent). The Technical Information Center (TIC) is responsible for managing the TIS Program. The TIS Program serves organizations and officials requiring technical information products and services in order to expedite the achievement of their missions. Because the Technical Information Services activities are an integral part of a successful long-term research and development program, the TIS budget request was moved from the Departmental Administration Appropriation to the Energy Supply Research and Development Appropriation in the FY 1983 budget.

The National Energy Act describes the responsibility of DOE with regard to implementation of the national energy goals. Most of the goals assigned to DOE are unobtainable without significant information gathering, processing and dissemination activities. The program authorities for the TIS Program are included in sections of 42 U.S.C. which charge DOE with the responsibility to manage and disseminate its technical information products. Support for the Department's implementation of recent legislation (P.L. 97-90, Sec. 148) and Presidential Executive Order No. 12333 relating to national security information is also the responsibility of the TIS Program.

The goals of DOE's centralized technical information management program are to promote the effective use of scientific and technical energy information as a national and agency resource and specifically to enhance the productivity of the energy R&D effort by avoiding unnecessary duplication of effort. The program is responsible for managing the internal information resulting from DOE's multibillion dollar R&D effort, as well as obtaining and disseminating the results of scientific and technological advances worldwide so that existing knowledge on energy R&D can be used to support decisionmaking by DOE program managers and the technical community.

Because classified defense and sensitive nuclear information is an integral part of the program, TIC maintains necessary operation and personnel controls and a security-approved facility and processing system.

Several recent developments support the continuation of a strong, centralized TIS Program. First, an economic analysis related to the value of the energy data base and related TIS products and services suggested that the centralized DOE information program saved the Department over $8.0 billion in time, materials and equipment by avoiding duplication of effort. The value of DOE's multi-billion dollar R&D investment is obtained primarily through the use of research results which, for the most part, are presented in published information. It was estimated that the Department's 60,000 scientists, engineers, and program managers read approximately 14 million articles and reports annually.

A second major management analysis recently completed was the report of the DOE Panel on International Scientific and Technical Information Policy entitled, "DOE Scientific and Technical Information in the World Arena." The report concludes that it is necessary for the U.S. to formally recognize the value of protecting its own scientific and technical information (STI) while taking full advantage of the worldwide STI so that it can effectively and competitively be used as a positive force to increase this nation's productivity and national security as well as to enhance its position in international trade and relations. The TISP is the central DOE point for coordinating STI control and dissemination programs to ensure maximum availability and use of information. The TIS Program plays a leading role in forwarding U.S. nuclear nonproliferation and safeguard goals and meets the U.S. commitments to the International Atomic Energy Agency, International Nuclear Information System (IAEA/INIS) as well as to the information programs of the IEA, NEA, and special bilateral agreements with our allies.

The third recent development that has focused on the significance of the centralized TIS Program is the increased attention at the national level on management and control of classified and sensitive information. The Executive Order 12333, the recent changes in the Classification Act, and the amendment to the Atomic Energy Act, Section 148, all require the need for tighter control of information in the interest of national security.

Budget Request Level - $14,100,000

	B/A in $1,000	
	FY 1983	FY 1984 Budget Request
Operating Expenses	$14,103	$13,300
Capital Equipment	1,150	800
Total	$15,253	$14,100
FTE Positions	(167)	(170)

Operating Expenses - $13,300,000

Funding and staffing at the budget request level will allow TIC to continue a fully centralized, integrated technical energy information program. Specific activities would include:

Energy Data Base (EDB) - TIC will continue to develop and expand the world's most comprehensive data base on energy science and technology. Over 200,000 items would be added, bringing the total entries to over 2 million. This represents the results of over $200 billion worth of world-wide investment in energy R&D over the past 30 years.

Defense and Technical Information - TIC will continue to maintain secured facilities and systems and qualified staff to manage and control the results of DOE classified R&D. The Weapons Data Base will continue to be produced to provide the weapons community with effective access and announcement of research developments. As part of this, TIC will continue to manage the classification notification system for DOE. As a result of the full implementation of laws and orders on national security information as well as increased dollars spent on defense-related basic research, there will be more material needing classified or special handling.

International Information Exchange Program - Because scientific and technological progress crosses national boundaries, well-controlled exchange of technical information is a necessary part of the national energy R&D program. The U.S., through TIC, has played a leadership role in the development of the International Atomic Energy Agency, International Nuclear Information System (INIS), since its inception in 1970. With the Administration's commitment to reestablishing the U.S. as a reliable nuclear supplier and as a leader in international nuclear affairs, TIC will continue to meet the U.S. obligation to INIS and make the results of nuclear research in other countries easily available to the U.S. nuclear community. TIC will also meet the Department's commitments to the International Energy Agency's Information Exchange Programs. In addition, TIC will continue to participate in special bilateral information exchange agreements with allies to ensure more comprehensive and timely access to research developments for DOE researchers and program managers. In 1984, TIC expects to receive and make available in the U.S. 100,000 items as a result of these exchange agreements.

Management of DOE Technical Publications - As a result of its R&D effort, DOE publishes over 25,000 technical reports annually. TIC will acquire these publications, distribute them to the appropriate users, and maintain effective access to them for future use as well as historical program documentation. Records of this material are put in machine-readable files and those of substantial technical interest added to the Energy Data Base. In addition to the 25,000 technical reports, over 32,000 DOE-funded publications are submitted to commercial publishers including journal articles, conference proceedings, etc. TIC provides DOE management access and control of these publications through its centralized data base system.

As part of DOE's publications control program, and consistent with P.L. 96-511 concerning paperwork reduction and information resources management, TIC has been assigned responsibility for the standard and special distribution of all DOE technical publications. In accordance with this responsibility, millions of publications are distributed annually on behalf of the Department. The TIC management systems support the distribution and inventory function so that this activity can be handled in a cost-effective manner on behalf of DOE program offices.

Access to Unclassified Energy R&D Results - In addition to acquisition, management, and data base resource development, a major objective of TIC is to provide effective access to all the technical information it manages. This is accomplished by producing abstract publications and bibliographies for DOE program offices and by making its data bases available through electronic means. Electronic access via on-line computer systems is made available through RECON and directly to TIC computers for special access to technical information system management files.

Research-in-Progress (RIP) - The DOE RIP information file was developed by TIC to obtain and process information on new and ongoing research programs and projects funded throughout the Department and to make this information available in a timely manner to DOE program and project managers as well as DOE and contractor scientists, researchers, and engineers. The availability of this information prevents duplication and overlap, discourages new starts in areas already adequately researched and studied, and provides scientists and engineers prompt and timely notification of ongoing research to aid and expedite their own research efforts. RIP will contain over 10,000 DOE energy project summaries and over 9,000 from non-DOE domestic and foreign countries.

Technical Information Monitoring System (TIMS) - TIC maintains a tracking and control system for approximately 12,000 contracts to assure that all R&D results in the form of publications contracted for by DOE are received, announced, and appropriately disseminated in a timely and systematic manner. TIMS was first developed in 1979 as a result of deficiencies in the R&D reporting process outlined by the DOE Inspector General in a 1978 audit report. If research is performed but the results never published or made known, that research is essentially lost and cannot positively impact program accomplishment.

Capital Equipment Requirements
(B/A in $000)

	1982	1983	1984
Total Capital Equipment	$1,300	$1,150	$800
ADP Requirements:			
KL-10 CPU			500
VAX Upgrade			185
Subtotal-ADP			685
Non-ADP Requirements			
Power Paper Cutter, 45"			40
Computerized Enlarger for Color Separations .			40
Offset Printing Press, 14x20.			20
Rapid Access Film Processor			15
Subtotal-Non-ADP			115
Total Capital Equipment Requirements			$800

ADP Equipment

The ADP equipment budget request of $685,000 allows for necessary additions to the current system. FY 1984 ADP items are described below:

- KL-10 CPU - TIC was granted a Delegation of Procurement Authority (DPA) from GSA to purchase DEC KL-10 CPU's on a sole-source basis on the condition that this equipment be replaced on a fully competitive basis in 40 months. TIC was allowed to delay the replacement in FY 1983 to identify conversion requirements and costs for a fully competitive procurement. This study of conversion costs was conducted by the Federal Conversion Support Center of GSA and the software conversion costs for non-compatible equipment was found to be prohibitive, resulting in the decision of the Office of ADP Management to allow a software compatible replacement or augmentation in FY 1984. A decision was made to add a third KL-10 CPU to minimize conversion time and costs and to accommodate the workload anticipated. A Functional Workload Requirements Study estimated the processing of more than 250,000 items of bibliographic data yearly, the handling of exchanges for 15 information programs, and the formatting of 70,000 pages per year.

- VAX Upgrade - The VAX 11/780 was purchased to provide access to TIC's data bases and for selected processing activities. As the number of users grows and retrieval and processing activities increase, the system must be augmented with more memory and disk storage.

Non-ADP Equipment

The non-ADP equipment items described below are to increase efficiency and to replace worn-out equipment.

- Power Paper Cutter - This is to replace an obsolete cutter that is 32 years old. The present cutter is worn out to the extent that it is becoming unsafe to operate.

- Computerized Enlarger for Color Separation - This is required to save time and materials in the use of color separation from transparencies in conjunction with TIC's four-color process printing. TIC's four-color process printing capability, which is unique to DOE, serves primarily the Defense Program.

- Offset Printing Press - This is required to replace a worn-out offset press. The existing 14x20 press is 14 years old and frequent malfunctions result.

- Rapid Access Film Processor - This is to replace and update film processing in TIC's photo-laboratory. The present processor is obsolete and incapable of processing large prints and charts.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Yrs.	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total Project funding							
1. Total facility costs							
(a) Construction line item..	$ 0	$120	$2,880	$2,550	$2,725	$2,225	$10,500
(b) PE&D	0	0	0	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$120	$2,880	$2,550	$2,725	$2,225	$10,500
2. Other project funding							
(a) R&D necessary to complete construction	20	0	0	0	0	0	20
(b) Other project related costs (training)	0	0	0	25	0	0	25
Total other project funding	$20	$0	$0	$25	$0	$0	$45
Total Project Funding (Item 1 & Item 2).......	$20	$120	$2,880	$2,575	$2,725	$2,225	$10,545

b. Total Related Funding Requirements (Estimated Life of Project: 25 Years)

(1) Facility Operating Costs (annual)........	$200
(2) Programmatic Operating Expenses Directly Related to the Facility........	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility........	0
(4) GPP or Other Construction Related to the Programmatic Effort in the Facility........	0
(5) Other Costs........	0
Total Other Related Annual Funding Requirements........	$ 200

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

- a. Total Project Funding
  - (1) Total Facility
    - (a) Construction Line Item.
    - (b) P E & D - No P E & D required.
    - (c) Expense Funded Equipment - There is no expense funded equipment.
    - (d) Inventories - There are no inventories required.
  - (2) Other Project Funding
    - (a) No R & D will be required. The estimate shown covers conceptual design activities.
    - (b) Other Project Related Costs - A one month personnel training program will be held, immediately prior to start-up of the system, for operation and maintenance people.
- b. Total Related Funding Requirements
  - (1) Annual operating and maintenance costs (less energy cost)
    Expected electrical energy use
    Steam, gas, or oil use
    Total annualized cost considering escalation and fuel cost adjustments.
  - (2) Programmatic Operating Expenses - None Required
  - (3) Capital Equipment not Related to Construction - None required.
  - (4) GPP or Other Construction Related to Programmatic Effort - No GPP funds are required by this project.
  - (5) Other Costs - None required.

Department of Energy
FY 1984 Congressional Budget
Plant Engineering and Design
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular Dollars in Thousands. Narrative Material in Whole Dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Plant engineering and design, Construction	$ 700	$ 700	$ 700	$1,000
Total, Plant engineering and design, non-defense......	$ 700	$ 700	$ 700	$1,000

Authorization: Sec. 161, P.L. 83-703

Summary of Changes

FY 1983 Appropriation..	$ 700
FY 1984 Base...	$ 700
Program Increases and Decreases	
+ Provide for design of 1 additional construction project	$ 300
FY 1984 Budget Request...	$1,000

PROGRAM OVERVIEW

The FY 1984 Departmental request for this activity is $1,000,000. Requested funds will be expended at various locations within the United States.

The purpose of this activity is to identify and support through the funding of advanced Architect-Engineering (A-E) services those proposed construction projects considered critical to the timely accomplishment of the Department's energy missions. The use of PE&D funding will permit selected non-defense projects to proceed directly from conceptual design into Preliminary (Title I) and Definitive (Title II) design prior to Congressional authorization. The advanced designs accomplished under this activity furnish a basis for assessment of the conceptual designs premises and data, for sound Departmental decisions regarding major funding commitments, and opportunities for accelerated execution of authorized projects. The amount requested for FY 1984 reflects a funding level sufficient to undertake advance designs for additional major facilities or systems that the Department has under consideration for future authorization requests.

Based on past experience, the request is anticipated to support 2 or 3 advanced designs. This reflects an average estimated cost per A-E service of about $400,000, however, the actual number of advance designs that can be initiated in FY 1984 will be influenced by a variety of interrelated factors. These factors include funding constraints, the total number and mix of candidate facility requirements identified by programs, the type of projects selected, individual design cost, and continuing realignments in Departmental priorities.

Design efforts accomplished will be sufficient to assure project feasibility, define the scope, provide detailed estimates of the cost of construction based on both approved designs and working drawings and specifications, and provide procurement and construction schedules. The designs will generally be extensive enough so that construction can physically start or contracts be let for long-lead procurement items in the budget fiscal year in which Congressional authorization is sought. Engineering designs funded under this activity may encompass the design requirements of any construction project except (1) designs needed for small construction projects for which the total estimated cost is less than $1,000,000 and included in the General Plant Project funding request; (2) designs required for projects to be authorized under Atomic Energy Defense Activities; and (3) conceptual designs accomplished with operating funds.

Conceptual studies completed for a project, utilizing operating funds, may often provide only a general project scope and a rough cost estimate. These conceptual design studies are often completed 9 to 12 months before the budget is submitted to the Congress. This results in the studies being as much as 24 months old by the time authorizing legislation is subject to enactment. Investment of Plant Engineering and Design funds for acquisition of A-E services permits selected projects to proceed directly from conceptual design to subsequent Preliminary (Title I) and Definitive (Title II) design phases and development of a solid engineering and investment basis to start construction. Revisions can be made to projects when necessary as a result of the design studies made prior to submission of the Department's Congressional budget.

Specific objectives for the PE&D program are to:

- Accomplish advance designs to assure feasibility, define project scope, and develop cost estimates that are reliable as possible for selected complex line-item construction projects.

- Complete the necessary advance designs prior to making Departmental commitments to major funding efforts for project construction.

- Make available more reliable cost estimates and other pertinent engineering related information for the projects to the Congress when the budget is presented.

- Permit accelerated initiation of project construction on long-lead procurements and thereby provide savings in construction or equipment costs based on current and projected rates of inflation.

The investment of funds for performing advance designs prior to project authorization provides the following specific benefits:

- availability of more reliable cost and schedule estimates to the Department and Congress at the time of budget consideration;
- uninterrupted design progression following completion of conceptual design studies;
- accelerated completion of DOE energy research and development construction projects to meet program mission needs;
- escalation cost savings due to accelerated design and physical construction.

Appropriated funding for the activity in FY 1982 was $700,000. A list of prior year projects and the allocation of funds for these efforts are displayed below:

Construction Project Title	PE&D Allocation
SLAC Linear Collider Stanford Linear Accelerator Center	$350,000
Sodium Component Test Facility Economizer, Santa Susana, California	350,000

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

POLICY AND MANAGEMENT

VOLUME 3

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Plant Engineering and Design (Non-Defense)

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Plant Engineering and Design, various locations

2. Project No. 84-PE&D-101

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3. Date A-E work initiated: 1st Qtr., FY 1984

3a. Date physical construction starts: N/A

4. Date construction ends: N/A

5. Previous cost estimate:
Date: None

6. Current cost estimate:
$1,000

---

7. Financial schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 700	$ 700	$ 700	$2,600
1983	--	--	--	1,000
1984	1,000	1,000	1,000	1,500
1985				640
1986				0
1987				0
1988				0

CONSTRUCTION PROJECT DATA SHEETS
Plant Engineering and Design (Non-Defense)

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1. Title and location of project: Plant Engineering and Design, various locations

2. Project No. 84-PE&D-101

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8. Brief Physical Description of Project:

This project provides for Architect-Engineering services (Title I and Title II) on Departmental construction projects (excluding those authorized under the Atomic Energy Defense Activities appropriation) which the DOE has under consideration for authorization requests in future years. Prior to being considered for Congressional authorization, this will allow certain designated projects to proceed from conceptual design into Preliminary Design (Title I) and Definitive Design (Title II). Design efforts accomplished under this project will be sufficient to assure project feasibility, define the scope and provide detailed estimates of the cost of construction schedules, including procurement. Designs will generally be extensive enough so that construction can physically start or contracts be let for long-lead procurement items in the budget year in which Congressional authorization is sought. Engineering designs accomplished under this project may encompass the design requirements of any construction project except (1) designs required for small construction projects for which the total estimated cost is less than $1,000,000 and included in the General Plant Project funding request; (2) designs required for projects to be authorized under Atomic Energy Defense Activities appropriation; and (3) conceptual designs accomplished with operating funds.

CONSTRUCTION PROJECT DATA SHEETS
Plant Engineering and Design (Non-Defense)

---

1. Title and location of project: Plant Engineering and Design, various locations

2. Project No. 84-PE&D-101

---

9. Purpose, Justification of Need for, and Scope of Project:

Conceptual studies completed for a project, utilizing operating funds, may often provide only a general project scope and a rough cost estimate. These conceptual design studies are often completed 9 to 12 months before the budget is submitted to the Congress, resulting in the studies being as much as 24 months old by the time authorizing legislation is enacted. The use of this project funding to proceed directly from conceptual design into Architect-Engineering designs would permit acceleration of new facilities, provide savings in construction costs based on current rates of inflation, and would permit more reliable cost estimates being available to the Congress when the budget is presented.

In addition, construction design services may be accomplished on projects determined to be of urgency to meet the needs for protection of life and property or health and safety that construction of such a project should be initiated promptly upon enactment of legislation appropriating funds for construction. PE&D funds provide a means of assuring expeditious completion of urgent projects in a timely and economic manner.

Listed below are examples of projects under consideration. Continuing study of program requirements may result in some of the projects being changed in scope, other projects being added, or necessary postponements of some now listed. Such modifications depend on conditions or situations that may occur in the future but are not presently apparent.

Candidate Projects	Amount Requested for Designs
High Energy, High Duty Factor Electron Accelerator Facility	$ 400,000
TFTR Upgrade	$ 300,000
West Valley Solidification Facility	$ 300,000

CONSTRUCTION PROJECT DATA SHEETS
Plant Engineering and Design (Non-Defense)

---

1. Title and location of project: Plant Engineering
and Design, various locations

2. Project No. 84-PE&D-101

---

10. Details of Cost Estimate:

	Total Cost
Engineering and design	$1,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Policy and Management - Energy Research
Energy Supply Research and Development - Operating Expenses
Supporting Research and Technical Analysis
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Policy and Management- Energy Research - Operating Expenses............	$ 1,040	$ 1,250	$ 1,250	$ 515
Total..........................	$ 1,040*	$ 1,250*	$ 1,250	$ 515
Staffing FTP/Total FTE's...............	19/21	18/20	18/20	8/8

*Reflects comparability adjustments to General Science Program Direction of $575,000 and $272,000 in FY 1982 and FY 1983, respectively, and to Biological and Environmental Research of $57,000 and $150,000 in FY 1982 and FY 1983, respectively.

Authorization: Section 209, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
Policy and Management - Energy Research
(dollars in thousands)

FY 1983 Appropriation..	$ 1,250
Decrease associated with personnel reduction...........................	- 735
FY 1984 Budget Request...	$ 515

Policy and Management - Energy Research

The FY 1984 budget request for Policy and Management - Energy Research is $515,000, a decrease of $735,000 from FY 1983. These funds are required to provide for the salaries and related expenses associated with 8 full-time equivalents in the Office of the Director, Office of Energy Research, and the Office of Management. This staffing level represents a decrease of 12 full-time equivalents below the revised FY 1983 level. The requested funding will provide for the normal increased personnel costs of 8 FTE's such as within-grade and merit increases and benefits. The funding further reflects the impact on average salaries of the FY 1982 and FY 1983 pay cap increases and two general pay increases in FY 1982 and FY 1983.

This staff provides overall high level management and direction for the Office of Energy Research responsibilities carried out under the following specific programs: High Energy Physics; Nuclear Physics; Biological and Environmental Research; Magnetic Fusion Energy; Basic Energy Sciences; Energy Oversight, Research Analysis and University Support; Multiprogram General Purpose Facilities; and the new University Research Instrumentation Initiative.

In addition to directing the Office's research programs cited above, the Director, Energy Research, also serves as the principal science advisor in formulating basic research policy. In this capacity, the Director provides independent reviews, analyses and recommendations concerning a wide range of activities which require scientific counsel. These activities include, for example, national research and development strategies, plans and policies, including budgetary priorities for energy research and development programs. They also include advising on policy issues regarding the best utilization of the nonweapons multipurpose laboratories assigned to Energy Research for oversight and management. These advisory and oversight responsibilities are carried out through meetings with top management and program officials as necessary throughout the year; interactions with laboratories; presentations to the Energy Research Advisory Board; participation in Congressional hearings; and interactions with the scientific community as a whole.

The Office of Management is responsible to the Director to ensure that Energy Research management structures, procedures, and program planning and budgeting systems are responsive to agency requirements for effective, efficient, and economical achievement of planning goals and program objectives. The staff funded from this program provides the principal managerial direction to all administrative, financial, procurement, and construction management oversight activities of the Office of Management.

Department Of Energy
FY 1984 Congressional Budget Request
LEAD TABLE
Environmental Protection, Safety, and Emergency Preparedness
Energy Supply Research and Development
Policy and Management - EP
(Tabular Dollars in Thousands,
Narrative Material in Whole Dollars)

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Base	FY 1984 Request
Policy and Management - EP				
Program Direction				
Operating Expenses	$ 1,897	$ 2,103	$ 2,103	$ 900
Staffing				
FTP/Total FTE's	40/43	28/28	28/29	18/19

Authorization: P.L. 95-91

SUMMARY OF CHANGES
Energy Supply Research and Development
(In Thousands of Dollars)

FY 1983 Appropriation Enacted	$ 2,103
FY 1983 Pay Raise	-
FY 1984 Base	2,103
Less 9 Staff Years	1,203
FY 1984 Request	$ 900

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
POLICY AND MANAGEMENT - EP
NARRATIVE JUSTIFICATION

The objective of the Policy and Management decision unit is to provide executive direction, management assistance and administration support to all programs of the Office of the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness (EP). The resources requested in this decision unit support the immediate office of the Assistant Secretary and the Office of Management Services.

The Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness is the principal advisor to the Secretary of Energy on the environmental impact of DOE activities, on DOE safety programs, and on energy emergency preparedness and contingency planning. His responsibilities include the management and administration of the Strategic Petroleum Reserve and the Naval Petroleum Reserves; the formulation and direction of specialized programs which assure that national environmental protection objectives and goals are incorporated in Departmental initiatives to plan, develop, and implement national energy programs and which protect the public and employees' health and safety in the execution of DOE programs; and the formulation, direction and coordination of energy emergency planning and response activities. Principal activities include dealing with policy issues, monitoring EP programs, preparing for Congressional hearings and public appearances, and coordination of issues and activities with senior management in DOE, with OMB, the White House, and other agencies, and liaison with the Congress.

The Office of Management Services consists of a Planning and Financial Management Division and a Management Assistance Division. The Planning and Financial Management Division provides direction and control of budget preparation and execution, procurement and contracts, and fiscal and financial management. The Management Assistance Division is responsible for management analysis, correspondence control, administrative support of personnel and training activities, and coordination of general services support and other activities which cut across organizational lines.

Fiscal Year 1983 accomplishments include:

- Advised and supported the Secretary and other senior DOE officials on the needs, options and priorities for environmental protection, safety, for energy production and for the provision of emergency reserves and planning.

- Provided management control and support for programs with budget authority of approximately $2.6 billion and revenues of approximately $1.7 billion.

- Instituted a comprehensive financial reporting system to include all procurement, travel, payroll, and FTE consumption.

- Provided administrative and personnel support for over 580 employees.

- Planned, coordinated, and directed programs' submissions to the Department's Planning, Programming, and Budget System.
- Implemented management activities necessary to achieve program goals and objectives.

Specific objectives for FY 1984 include:

- Provide executive direction to the programs.
- Advise and support senior officials on the needs, actions and priorities for the programs supported.
- Provide policy and program guidance and support.
- Direct and coordinate budget formulation and execution activities.
- Implement a comprehensive program planning system.
- Conduct evaluations on program effectiveness and efficiency.
- Enhance the quality of responsiveness to the Secretary, other senior officials, Congress, and the Public.

Accomplishment of these objectives will provide for the orderly, timely and efficient achievement of program goals and objectives resulting in increased environmental protection, safety, energy supplies, federal reserves and provision for emergency energy supplies and plans.

The Request Level for this unit totals $900,000 and 19 full-time equivalent positions. These staff-year resources would support major EP program elements to achieve their program goals and objectives. Functions that would be carried out with these staff years include:

- Preparation of periodic reports and analyses of field expenditures.
- Review of program level internal control systems with respect to expenditures and receipts (with recommendations to ASEP if required).
- Analysis and coordination of EP procurement activities.
- Analysis of personnel management issues and ceiling control procedures.
- Effective and timely response to Federal Register requirements, GAO and Congressional inquires, and crosscutting DOE activities.

These staff-years resources will assure adequate management support provided to EP operating programs. These in turn will make a significant contribution to the progress which EP will make towards fulfilling its goals of improved environmental protection, safety, and emergency preparedness.

FY 1984 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

Policy and Management - EP

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	ESTIMATED ACTIVITIES DURING FY 1984
Policy and Management	Perform executive management, policy formulation, and administrative support for the Office of the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness, including the following programs: . Strategic Petroleum Reserve . Naval Petroleum and Oil Shale Reserves . Environment, Safety and Health . Emergency Preparedness	Perform executive mgmt., policy formulation,and administrative support for the Office of the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness, including the following programs: . Strategic Petroleum Reserve . Naval Petroleum and Oil Shale Reserves . Environment, Safety, and Health . Emergency Preparedness

Nuclear
Energy Supply Research and Development-Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Policy and Management (NE)				
Operating Expenses	$ 1,610	$ 1,584	$ 1,584	$ 1,370
Total	1,610	1,584	1,584	1,370
Staffing	31/34	34/37	34/37	20/22

Authorization: Section 31, P.L. 83-703

SUMMARY OF CHANGES
Energy Supply Research and Development
(Dollars in thousands)

FY 1983 Appropriation*	$ 1,584
Built-in increases and decreases	0
FY 1983 Base	1,548
Program increases and decreases	$ -214
Operating	-214

- o Reflects decrease in overall staffing, in part due to consolidation through reorganization and in part through planned commercializing of certain administrative type services.

Program Budget Justification

	FY 1983 Appropriation*	FY 1984 Base	FY 1984 Request
Policy and Management	$ 1,584	$ 1,584	$ 1,370

The objective of the Policy and Management activity is to provide adequate staffing for policy development, plans formulation, resource management, and program assessment within the nuclear sector. Included are sufficient travel funds to effect efficient performance of policy and planning development, resource management, program assessment and general management of the nuclear energy program.

The requested budget reflects a decrease in overall staffing in FY 1984. The personnel requirements are 20 FTP's/22 FTE's including 2 OTFTE's. This manpower base provides the technical and management expertise needed to direct and administer a varied research and development, operational and defense program valued at over $4,000,000,000. Functions performed by individuals budgeted under this program include: policy development, strategy planning, program assessment, resource management and institutional relations.

These efforts require the combined skills of technically trained managers, administrators and secretaries. The R&D activities encompass seven different technologies, at various stages of development, and are performed at different contractor locations to include national laboratories, universities, industrial concerns and foreign governments; the operational activities involving uranium enrichment are also performed at decentralized locations, primarily at Oak Ridge, Tennessee, Portsmouth, Ohio, and Paducah, Kentucky. Defense activities support the Naval Reactors development program.

General Management: This level supports positions for the Assistant Secretary (AS), the principal Deputy Assistant Secretary (DAS), the Executive Technical Advisor, and a clerical staff of three.

Program Support: Provides for staffing in four principle areas:

Safety, Quality Assurance and Safeguards: The function of this Division is to serve as primary ASNE interface with other DOE organizations (EP and DP) involved with safety and safeguards overview activities, perform independent safety, safeguards and quality assurance assessments across all civilian nuclear energy activities, develop and manage a nuclear surveillance program for ASNE activities and serve as primary ASNE interface with commercial and other Government organizations.

Plans and Evaluation: This level provides professional and clerical staff needed for the development of plans and strategy in the nuclear sector, the preparation of testimony and special correspondence, the analysis of legislation and the coordination of the Program Planning and Budgetary System. Minimally covered are program assessment activities.

Resource Management: This organizational component includes such management support activities as personnel, budget formulation, budget execution, administrative management of funds, procurement and contract administration, business management and program/project management, including major systems acquisitions, cost estimating, project and program plan development and project reviews. The Office also includes two centralized support activities, the mail room and word processing.

International: This group of technical specialists develop and implement ASNE international policy option, formulate and implement integrated nuclear export marketing approaches, expand U.S. cooperation with nuclear programs of other countries and represent ASNE to international organizations involved with nuclear energy.

The requested budget also provides financial resources to enable the Assistant Secretary and the office staff to perform the requisite travel functions of the organization. The required funds will permit attendance at public meetings either sponsored by the Agency or others, performance of program and policy reviews at contractor or field office locations, maintenance and development of international cooperative agreements, pursuit of nonproliferation ideals, involvement with nuclear energy source selection boards, furtherance of employee development and participation in the employment cycle. This latter effort includes invitational travel and change of station orders. With respect to change of station, the requested funds cover employee and family transportation costs, per diem costs and temporary quarters costs. These funds do not provide for the movement of household goods. Special assignments like reactor safety reviews or litigations are not supported by this request.

Department of Energy
FY 1984 Congressional Budget
Lead Table

Policy and Management - Assistant Secretary for Conservation and Renewable Energy
Conservation and Renewable Energy Program Support
Energy Supply Research and Development Appropriation

The immediate Office of the Assistant Secretary and the Program Support offices are responsible for Assistant Secretary-level management and centralized management services for the Office of Conservation and Renewable Energy. These offices provide overall planning, budgeting and other management services for Conservation and Renewable Energy Programs.

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Assistant Secretary for Conservation and Renewable Energy	$ 250	$ 250	$ 255	$ 255
Conservation and Renewable Energy Support	563	563	715	715
Total	$ 813	$ 813	$ 970	$ 970
Staffing FTP/Total FTE's	10/13	11/11	11/11	19/19

SUMMARY OF CHANGES

FY 1983	$ 813
Increased FTE's	+ 400
Reduced program support costs	- 243
FY 1984 Congressional request	$ 970

Funding requested for FY 1984 provides for the salaries and related expenses associated with 19 full-time equivalent staff years of effort in the immediate offices of the Assistant Secretary for Conservation and Renewable Energy and the Director, Policy and Management.

This staff provides overall senior level management and direction for the Conservation and Renewable Energy activities carried out under the following specific programs: conservation research; state, local and multi-sector grants; renewable energy research; and power marketing.

DOE/MA-0064/1
VOLUME 4 OF 7

CONGRESSIONAL BUDGET REQUEST

FY 1984

VOLUME 4

GENERAL SCIENCE AND RESEARCH
URANIUM ENRICHMENT
GEOTHERMAL RESOURCES DEVELOPMENT FUND

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

URANIUM ENRICHMENT

GEOTHERMAL RESOURCES DEVELOPMENT FUND

VOLUME 4

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DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	—	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities ..	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration ...	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration .	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration .	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration .	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund .	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	—	-3,331	—	-5,000	—	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	—	—	217,325	179,481	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	—	2,200	2,100	2,100
Special Foreign Currency	—	312	—	—	—	—
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,081	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	---	39,213	---	23,491	---	---
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

VOLUME 4

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

[General Science and Research Activities, Operating Expenses]

[General Science and Research Activities, Plant and Capital Equipment]

General Science and Research Activities

For expenses of energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for general science and research activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 12 for replacement only); $645,250,000 to remain available until expended.

Explanation of Change

FY 1983 Continuing Resolution did not provide specific appropriation language for this account, therefore, new language is proposed for FY 1984.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

GENERAL SCIENCE AND RESEARCH

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL.			
ES-6			
ES-5	1	1	1
ES-4	3	3	4
ES-3			
ES-2	1	1	1
ES-1			
SUBTOTAL.	5	5	6
GS-18			
GS-17			
GS-16			
GS/GM-15	11	10	12
GS/GM-14	1	1	2
GS/GM-13			
GS-12	1	1	1
GS-11	1		4
GS-10			
GS-9	1	1	2
GS-8	1	1	1
GS-7	3	2	3
GS-6	1	1	
GS-5	2	2	2
GS-4			
GS-3			
GS-2			
GS-1			
SUBTOTAL.	22	19	27
UNGRADED			
TOTAL PERMANENT POSITIONS	27	24	33
UNFILLED POSITIONS, END OF YEAR . . .	1		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	26	24	33

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

GENERAL SCIENCE AND RESEARCH

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
High Energy Physics	364,500	422,146	490,000
Nuclear Physics	133,881	130,509	153,000
High Energy and Nuclear Physics Program Direction	1,713	1,413	2,250
Subtotal, General Science and Research	500,094	554,068	645,250
Adjustments	-5,000	-11,520	—
Total, General Science and Research.	495,094	542,548	645,250

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW
High Energy and Nuclear Physics
Basic Sciences
General Science and Research - Operating Expenses
General Science and Research - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

The Agency's General Science programs are concerned with basic research to discover and understand the fundamental constituents of matter and energy and the basic forces in nature. These constituents, the forces between them, and the physical laws governing their interactions form the basis for all of the physical sciences. Understanding of the laws of nature and the basic components from which matter and energy in all their varied forms are composed forms the foundation upon which all of modern science and technology rests. Deeper understanding correspondingly contributes, sometimes in spectacular ways, to all of the scientific disciplines and to our Nation's technological base.

The Department's General Science program is organized into two interrelated scientific programs, High Energy Physics and Nuclear Physics. While these programs are not directly associated with energy technology in the near or mid-term, they support basic research whose aim is to provide new knowledge which is expected to have long-term scientific and technological impacts on energy development and utilization and on other aspects of our society. The salaries, benefits and associated costs of the staff of the High Energy Physics and Nuclear Physics programs are also included in the Basic Sciences category as a separate program, called General Science Program Direction.

The purpose of the High Energy Physics and Nuclear Physics programs is to perform exploratory forefront research on the structure, constituents and properties of submicroscopic matter, to study the basic forces of nature and their relationship, and to study the transformations of matter and energy at the most elemental level. History has shown that this type of basic research has significant long-term benefits, e.g., the discovery of both fission and fusion of nuclei resulted from the kind of basic research undertaken in these programs earlier in the century. The Department, along with its predecessor agencies, has a history of effectively managing and operating the large, high technology facilities and research activities which characterize high energy physics and nuclear physics, acts as executive agent for these programs and operates them as national trusts.

Matter is made up of substances known as the chemical elements. The smallest distinguishable unit of an element is the atom. Within the atom, there is a central part called the nucleus which contains most of the mass of the atom. The constituents of the nucleus are neutrons and protons, which in turn are now believed to be made up of more elementary particles, called quarks. The Nuclear Physics program strives to attain a deeper understanding of the structure and properties of atomic nuclei and the forces governing their motion and interactions. The High Energy Physics program delves even deeper. It strives to reach the ultimate description of matter and energy through discovering and studying the properties of the most basic constituent building blocks of matter (quarks), and the nature and relationship of the four known basic forces acting among them.

High Energy Physics is an exploratory field of basic research in which experimental and theoretical studies are conducted on the fundamental constituents of matter and the fundamental forces of nature in an attempt to understand energy and matter and their most elemental transformations. In recent years outstanding progress has been made toward the unification of the forces of nature and toward understanding the ultimate structure of matter in terms of basic constituent quarks and leptons. In achieving these levels of knowledge, United States high energy physicists have won or shared in three Nobel prizes in physics during the last five years.

Major current objectives of High Energy Physics are the unification of the basic forces into a single comprehensive theoretical framework, the search for the Z^0 predicted by the electroweak unified force theory and effects (such as proton decay) predicted by the grand unified theories which attempt to unify the electroweak and strong force. The basic experimental technique used is to study the results of violent collisions of very high energy particles with fixed targets or with other particle or antiparticle beams. In these collisions many entirely new forms of matter can be produced in an energy/matter interchange, and the study of the interactions reveals properties of the underlying building blocks and basic forces involved.

Nuclear Physics is an exploratory field of basic research in which experimental and theoretical studies are conducted on structure and behavior of atomic nuclei and the understanding of the behavior of nuclei in terms of the fundamental constituents of matter and laws of nature. Atomic nuclei are especially fruitful for fundamental physics studies since only in nuclei do three of the forces of nature, electromagnetic force, weak nuclear force, and strong nuclear force, come into play simultaneously. Nuclear physics research is strongly coupled to high energy physics research. Not only are the experimental and theoretical tools similar, but also the progress in the two fields interact synergistically. For example, developments in understanding of the laws of nature and theoretical projections have led to development of a new theoretical framework, quantum chromodynamics (QCD), which promises to allow understanding of the strong nuclear force on a fundamental basis. Experiments in nuclei will allow tests of these theoretical developments and will provide guidance for future development of the theory.

High energy and nuclear physics research requires the use of large particle accelerators, colliding beam facilities and particle detectors. These few large scientific facilities are available to qualified scientists on the basis of the merit of their scientific proposals. Approximately 75% of the research in high energy physics is done by university-based scientists who usually form collaborations with scientists from other universities or laboratories. Proposals from university and laboratory user groups for accelerator research time are evaluated by scientific Program Advisory Committees which select those with the greatest scientific promise. The High Energy Physics program operates almost exclusively in this mode, while Nuclear Physics, in addition to national facilities, also supports a few smaller local facilities at universities and national laboratories. To complement, interpret, and guide the experimental work, each program supports a vigorous theoretical research effort at universities and at the national laboratories.

A major feature of the FY 1984 High Energy Physics program is the first full year of operation of the Energy Saver superconducting synchrotron at Fermilab for research in the 500-1000 GeV energy range. Priority is also given to operation and research utilization of the PEP facility. The budget requests funds to continue progress on the Tevatron I and Tevatron II construction projects at the Fermi National Accelerator Laboratory and to initiate construction of the SLAC Linear Collider (SLC) on a rapid schedule. The SLC project, which is strongly supported by the High Energy Physics community, will provide a valuable accelerator R&D function in demonstrating the feasibility of a new technique for economically feasible very high energy collisions and give U.S. physicists early access to exciting research in the area of the highly sought Z^0 particle. The overall utilization level of the High Energy Physics accelerator facilities will be about the same as the FY 1983 level of 55%. The request provides strong continuing support for university research groups including accelerator user efforts, non-accelerator experiments, theoretical research efforts and some opportunities for outstanding junior investigators. There will be a significant continuing accelerator R&D effort at Brookhaven National Laboratory to develop large aperture accelerator quality superconducting magnets, to develop and demonstrate techniques for fabricating the magnets reliably and cost effectively and to consider lower cost magnet options and alternate facility designs, as well as appropriately scoped R&D efforts at Fermilab and SLAC in support of on-going construction efforts.

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DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,631
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	190	160	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,330	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,120	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,670	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX EMERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

In FY 1984, emphasis in the Nuclear Physics program will be given to exploitation of new research capability provided by successful completion of construction projects in FY 1982 and FY 1983. These include: (1) the capability to accelerate ions as heavy as uranium to low energies in the SuperHILAC and to high energies in the Bevalac (Lawrence Berkeley Laboratory); (2) the completion of the Bates Electron Accelerator recirculator project (MIT) which provides electron beams for precision electron-nuclear scattering studies at higher energies than previously available; and (3) newly available heavy ion beams at the Holifield Heavy Ion Research Facility (Oak Ridge National Laboratory) and the Argonne Tandem/Linac (Argonne National Laboratory) which will allow high prevision neavy ion physics studies at higher energies than previously available. These new capabilities together with the low energy injector for the Stanford Linear Accelerator proposed for construction in FY 1984 provide unique new capabilities for study on nuclear matter in regimes never before investigated and will allow investigations to explore the influence of the quark substructure of nucleons on the properties and behavior of nuclei.

To strengthen university research capabilities, upgrade of accelerator facilities at Yale University and University of Washington is planned (Total Estimated Cost = $19.0 million; $8.0 million in FY 1984 and $11.0 million in FY 1985).

Nuclear knowledge, techniques, instruments, and applications pervade modern American society. These serve as the basis for our national defense strategy, for therapeutic and diagnostic medical application, for generation of electricity with nuclear processes to serve our economy, and for a large and diverse array of applications in industry and other areas of science. Pursuit of the High Energy and Nuclear Physics programs yields an ever deeper understanding of the constituents of matter and energy and their role in the physical universe, and provides a national base of knowledge, techniques, instrumentation, and skilled manpower in critical technologies.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW
High Energy and Nuclear Physics
Basic Sciences
General Science and Research - Operating Expenses
General Science and Research - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Estimate	FY 1984 Base	FY 1984 Request
High Energy Physics (HEP)				
Physics Research				
Operating Expenses	$ 78,000	$ 92,174	$ 92,174	$101,500
Subtotal	78,000	92,174	92,174	101,500
Facility Operations				
Operating Expenses	124,400	152,100	152,100	166,000
Capital Equipment	40,700	46,372	46,372	51,500
Construction	54,600	55,500	55,500	89,000
Subtotal	219,700	253,972	253,972	306,500
High Energy Technology				
Operating Expenses	66,800	76,000	76,000	82,000
Subtotal	66,800	76,000	76,000	82,000
Total				
Operating Expenses	269,200	320,274	320,274	349,500
Capital Equipment	40,700	46,372	46,372	51,500
Construction	54,600	55,500	55,500	89,000
High Energy Physics	$364,500	$422,146	$422,146	$490,000
Nuclear Physics (NP)				
Medium Energy Nuclear Physics				
Operating Expenses	$ 50,600[a]	$ 52,258	$ 52,258	$ 59,000
Subtotal	50,600	52,258	52,258	59,000
Heavy Ion Nuclear Physics				
Operating Expenses	41,814[b]	39,700	39,700	47,000
Subtotal	41,814	39,700	39,700	47,000
Low Energy Nuclear Physics				
Operating Expenses	12,257[c]	12,257[c]	12,257	13,000
Subtotal	12,257	12,257	12,257	13,000
Nuclear Theory				
Operating Expenses	7,700	8,150	8,150	9,000
Subtotal	7,700	8,150	8,150	9,000
Capital Equipment	9,510[d]	10,444[d]	10,444	11,300
Construction	12,000	7,700	7,700	13,700
Total				
Operating Expenses	112,371	112,365	112,365	128,000
Capital Equipment	9,510	10,444	10,444	11,300
Construction.................	12,000	7,700	7,700	13,700
Nuclear Physics	$133,881	$130,509	$130,509	$153,000

[a] Does not include $2,000,000 in FY 1982 which was budgeted under Defense Programs for LAMPF Operations.

[b] Includes $2,714,000 in FY 1982 which was budgeted under Life Sciences and Nuclear Medicine Applications for Bevalac facility operations. Also includes $1,000,000 FY 1981 deferral.

[c] Budgeted under Nuclear Science subprogram of Basic Energy Sciences in FY 1982 and FY 1983.

[d] Includes $510,000 in FY 1982 and $510,000 in FY 1983 which was budgeted under Nuclear Sciences subprogram of Basic Energy Sciences.

General Science Program Direction				
Operating Expenses	$ 1,713	$ 1,413	$ 1,413	$ 2,250
Program Direction	$ 1,713[e]	$ 1,413[e]	$ 1,413	$ 2,250
Total				
Operating Expenses	$383,284	$434,052	$434,052	$479,750
Capital Equipment	50,210	56,816	56,816	62,800
Construction	66,600	63,200	63,200	102,700
Subtotal	$500,094	$554,068	$554,068	$645,250
Less Appropriation Transfer.	0	-11,520	0	0
General Science and Research..	$500,094	$542,548	$554,068	$645,250

Authorization: Section 209, P.L. 95-91

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[e] Reflects transfer to Biological and Environmental Research of $222,000 and $226,000 in FY 1982 and FY 1983, respectively, for 4 FTE's associated with the Life Sciences Research and Nuclear Medicine Applications Program. Also reflects transfer from Policy and Management of $272,000 in FY 1983 for 6 FTE's associated with the High Energy and Nuclear Physics programs.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
High Energy Physics
General Science and Research - Operating Expenses
General Science and Research - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
High Energy Physics (HEP)				
Physics Research				
Operating expenses.....	$ 78,000	$ 92,174	$ 92,174	$101,500
Subtotal.........	78,000	92,174	92,174	101,500
Facility Operations				
Operating expenses.....	124,400	152,100	152,100	166,000
Capital equipment......	40,700	46,372	46,372	51,500
Construction...........	54,600	55,500	55,500	89,000
Subtotal.........	219,700	253,972	253,972	306,500
High Energy Technology				
Operating expenses.....	66,800	76,000	76,000	82,000
Subtotal.........	66,800	76,000	76,000	82,000
Total				
Operating expenses.....	269,200	320,274	320,274	349,500
Capital equipment......	40,700	46,372	46,372	51,500
Construction...........	54,600	55,500	55,500	89,000
High energy physics.........	$364,500	$422,146	$422,146	$490,000

Staffing FTP/Total FTE's: (Reference General Science Program Direction Decision Unit).

Authorization: Section 209, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
High Energy Physics
(dollars in thousands)

FY 1983 Appropriation enacted	$422,146
Built in increases and decreases	0
FY 1983 Base	$422,146
Program increases and decreases	
High Energy Physics	
o Initiate construction of Stanford Linear Collider (SLC) on rapid schedule	+40,000
o Continue construction of Tevatron I and Tevatron II as planned	- 3,000
o No ISABELLE construction funds	- 5,000
o Maintain continuing level for Accelerator Improvement Projects (AIP) and General Plant Projects (GPP) (taking into account new facilities to be on-line at Fermilab)	+ 1,500
o Maintain average facility utilization at about the 55% level	+13,900
o Maintain strength of research groups at a level commensurate with accelerator operating schedules and needs of non accelerator experiments such as proton lifetime	+ 7,826
o Maintain appropriate level of advanced technology R&D, particularly for CBA R&D at BNL on superconducting magnets and cost effective fabrication	+ 6,000
o Provide capital equipment support with particular emphasis on the high priority needs for implementing a 1000 GeV research program at Fermilab and for a major detector for SLC	+ 5,128
o Mandated increment for Small Business Innovation Research program	+ 1,500
FY 1984 budget request	$490,000

High Energy Physics

The High Energy Physics program is a basic research program which seeks to understand the laws of nature which govern the fundamental behavior of matter and energy. The comprehension of the physical universe is an age-old activity of mankind which has led to an increasingly better understanding of the ultimate structure of matter and the nature of the basic forces which govern the interactions and elemental transformations of matter and energy. These past discoveries and the knowledge resulting from them have made possible the highly technological world in which we live. In this century, scientific investigation has focused on ever more fundamental constituents of matter, with the research frontier moving from molecules to atoms, to nuclei, to the constituents of nuclei (protons and neutrons) and recently to even more elemental subnuclear constituents, called quarks and gluons. This most basic scientific endeavor is managed by DOE as a national trust, with the goal of maintaining a comprehensive and productive national program and a world leadership position for the United States.

The framework for comprehending natural phenomena has rested on the observation that all occurrences in nature can be described in terms of just four fundamental forces. The "electromagnetic" force describes how atoms and molecules are formed and is the cornerstone to understanding all chemistry, electronic communication and biological processes. The "weak nuclear" force describes processes such as the radioactive decay of nuclei and the relative abundances of the chemical elements. The "strong nuclear" force describes why the nuclei of atoms are so small and stable, how they are made in burning stars, and how they make stars burn so brightly. The "gravitational" force describes falling rocks, circling planets, and the clustering of stars in galaxies.

Part of the recent great progress in science has been an effective reduction of the number of basic forces through the conceptual unification of the weak nuclear and electromagnetic forces into a single force -- the electroweak force. The experimental discoveries during the past decade of neutral weak currents and particles with charmed and heavier quark constituents confirmed this concept of unification. The electromagnetic and weak forces can now be viewed in a natural way as different aspects of one electroweak force. The 1979 Nobel Prize in Physics was awarded to three theoretical high energy physicists (two from the U.S.) for their work toward this unification.

There is now strong anticipation that the unification of the strong and electroweak forces into one "grand unified" force may be possible thereby reducing the number of basic forces in nature to only two. The energy scale of this grand unification is indicated through work which led to the award of the 1982 Nobel prize in physics to a U.S. theoretical physicist. Early theoretical predictions of this grand unification scheme give a possible explanation of the experimentally observed inbalance between the abundance of matter and antimatter in our universe. The 1980 Nobel Prize in Physics was awarded to two U.S. experimental high energy physicists for research which indicated that the most elemental processes (which were thought to lead to matter-antimatter equality) are not exactly reversible. Other predictions of the grand unification models are that protons which were previously thought to be absolutely stable do eventually decay and that neutrinos which were previously thought to be massless, may in fact have a small mass. Special emphasis in the experimental program is focused on testing these predictions of the grand unified theories. If verified by experiments currently in progress, there would be a major scientific breakthrough which would advance in a major way progress toward the grand unification of the strong and electroweak forces. These new concepts may lead to a profound understanding of how the universe evolved from the proposed primordial big bang beginning to its present state and whether the universe will expand forever or perhaps contract again in the distant future to another fireball.

Eventually, it is anticipated that the gravitational force can be incorporated into a super-grand unification scheme, thereby bringing all of the basic forces into a single unified framework, a lifelong goal of Einstein. Exactly what will follow from the various stages of unification cannot be predicted in detail at this time. However, one can certainly anticipate profound world-changing effects analogous to those which followed the unification of electricity and magnetism by Maxwell late in the 19th century and the unification of matter and energy by Einstein early in this century.

Progress in high energy physics research is based on a complex and continuing interplay of advancements in experiment, theory and technology. Each is strongly dependent for its progress on the advancement of the others. High energy physics experiments often expand the horizons of theoretical and technical knowledge, and the range of possible experiments is often determined by technological as well as conceptual limitations. Physicists frequently have to invent new and unique apparatus and novel techniques in order to carry out the experiments of greatest interest, thereby contributing directly and immediately to the technology resources of the country. Similarly theory and technology drive, and are in turn driven by, the results and needs of experiments.

To probe into the depths of matter, into the domain of quarks and gluons, it is necessary to use intense beams of very energetic particles which are only available from high energy particle accelerators. Through studying the results of the violent collisions of these accelerated particles with other particles in dense fixed targets or in another beam, information is acquired about their constituents and about the forces which act within and between them. The high energy particle accelerator and colliding beam facilities to be operated by the Department in FY 1984 include the 30 GeV (billion electron volt) Alternating Gradient (proton) Synchrotron (AGS) at Brookhaven National Laboratory (BNL), the 1000 GeV superconducting magnet proton synchrotron at Fermi National Accelerator Laboratory (Fermilab), and the 32 GeV linear electron accelerator at the Stanford Linear Accelerator Center (SLAC). SLAC also has two electron-positron colliding beam facilities for which the linear accelerator acts as an injector, the SPEAR (4 GeV x 4 GeV) and the Positron-Electron Project (PEP) (15 GeV x 15 GeV). Each of these DOE accelerator centers provides a unique set of experimental capabilities, complementary in many ways to the others. As an ensemble they provide the facilities essential for a comprehensive forefront national research program in high energy physics. The major part of High Energy Physics funding is required to meet the direct needs of the accelerator laboratories. However, the accelerator laboratories provide the data source for all accelerator based high energy physics research, about 75% or more of which is carried out by the university based user groups. Therefore, about three-quarters of the funding provided to the accelerator laboratories can be considered as indirect support of the university program.

New higher energy facilities are being phased in sequentially. At Fermilab, a multi-step development program is underway. The first step is the Energy Saver, a ring of superconducting magnets being installed in the present main ring tunnel, which will reduce the electric power needs and extend operation of the accelerator to 500 GeV for fixed-target experiments. Installation of the Energy Saver is proceeding well and first circulating beam is scheduled for the middle of FY 1983. Use of superconducting magnets for operation at 500 GeV and higher makes possible a major saving of electric power relative to that required by the present magnets operating at 400 GeV. The second step, Tevatron I, upgrades the Energy Saver ring for operation at about 1000 GeV and provides 1000 GeV x 1000 GeV proton-antiproton colliding beam capability using the Energy Saver ring. This project was initiated in FY 1981, with completion projected for FY 1986. The third step, Tevatron II, will provide for extraction of the 1000 GeV beam from the accelerator and for development of 1000 GeV fixed-target research capabilities in the experimental areas external to the Fermilab main accelerator tunnel. This project was initiated in FY 1982 and will be brought into operation in a phased manner beginning in FY 1983 until its final completion scheduled for FY 1985. Funds are requested in FY 1984 to initiate construction of the SLAC Linear Collider (SLC) on a rapid schedule. The SLC has very high priority in the U.S. high energy physics program. This project has as a primary goal to develop and demonstrate the practicality of using linear accelerators with precisely controlled, high intensity and highly focused beam pulses to provide high luminosity electron-positron or electron-electron collisions at energies far beyond those which will be affordable for circular colliders. It is planned for completion on a rapid, three year construction schedule. This will then give the U.S. earliest access to highly exciting physics associated with the anticipated copious production of the Z^0 boson with high energy electron-positron colliders, predicted by the recently unified electroweak force theory. At BNL, a major R&D effort is continued focusing on the design of high field superconducting magnets; development and demonstration of techniques to fabricate these magnets in a reproducible, reliable and cost effective manner; and consideration of alternate magnet and facility designs which could be the basis for a lower cost major new facility to be completed by the end of the decade. A decision on whether to seek funding to start construction of such a facility in FY 1985 will be based on results of the R&D studies, overall high energy physics program requirements, and budget considerations.

Planning and funding for the Department's High Energy Physics program in the FY 1979 - FY 1982 period have been based on a comprehensive long-range funding plan agreed to by DOE and OMB, whose objectives were: to maintain a productive and viable high energy physics program in the United States effectively utilizing three accelerator centers (BNL, Fermilab, and SLAC); to maintain United States' world leadership in the field; to permit the construction of new facilities as required; and to accomplish these goals within an approximately constant level of effort budget equal to or higher than that of FY 1979. The FY 1982 funding was substantially below the DOE-OMB plan level and was accommodated largely by a cutback of ISABELLE construction, by reduction in utilization and by program reductions at LBL and ANL. The FY 1984 budget request continues the recovery from that low level as planned in FY 1983, and permits a program near the FY 1979 level.

The FY 1984 request of $490,000,000 for High Energy Physics compared to $422,146,000 in FY 1983, would permit a High Energy Physics program with a good level of utilization of existing facilities, solid support for university based experimental user groups and theoretical research efforts, continued progress on the important Fermilab facility development program and initiation of construction of the high priority SLC project at SLAC at a rapid pace, with completion scheduled in FY 1986.

The FY 1984 request for operating expenses is $349,500,000 compared to $320,274,000 in FY 1983. A major feature of the FY 1984 program is the first full year of operation of the Energy Saver superconducting synchrotron at Fermilab for research in the new 500-1000 GeV energy range. Priority is also given to good operation and research utilization of the PEP facility; however, the fixed-target research program using the SLAC linac would be reduced somewhat to assist the rapid construction progress on SLC. The overall utilization level of the DOE HEP accelerator facilities will be about 55%, the same as in FY 1983. The request provides strong continuing support for university research groups including accelerator user group efforts, non-accelerator experiments, theoretical research efforts and some opportunities for outstanding junior investigators. There will be a significant continuing accelerator R&D effort at BNL to develop large aperture accelerator quality superconducting magnets, to develop and demonstrate techniques for fabricating the magnets reliably and cost effectively and to consider lower cost magnet options and alternate facility designs, as well as appropriately scoped R&D efforts at Fermilab and SLAC in support of on-going construction efforts. This request includes $2,100,000 for the Small Business Innovation Research program legislated by the Congress in 1982.

The capital equipment request of $51,500,000 compared to $46,372,000 in FY 1983 gives priority to Fermilab for the new secondary beam lines and detector systems needed for the 1000 GeV research program associated with the Tevatron II program and for work on the large colliding beam detector (CDF) needed for the Tevatron I research program and to SLAC for work on a detector for SLC research. To accommodate these special needs other programs remain at a somewhat reduced or near constant level of effort.

The request for construction funds is $89,000,000. The major feature is the initiation of SLC construction ($40,000,000) at a rapid pace at SLAC. Also included is the continuation of the Tevatron I ($20,000,000) and Tevatron II ($13,000,000) projects at Fermilab. Funds at BNL, Fermilab and SLAC are requested for accelerator Improvement Projects (AIP) ($9,000,000) and for General Plant Projects (GPP) ($7,000,000) which will provide the same level of effort as in FY 1983. The accelerator improvement projects are essential on an annual level-of-effort basis for maintaining the reliability and efficiency, as well as the scientific effectiveness of the existing accelerator facilities. The GPP projects are to keep the general plant of the laboratories, including buildings, utilities and roads, in a viable operating condition. With the superconducting Energy Saver synchrotron and associated cryogenic plant and support systems coming into operation in FY 1983, there is a significant expansion of the facilities which increase the need for AIP and GPP at Fermilab.

The High Energy Physics program may be considered to consist of three subprograms: Physics Research, Facility Operations and High Energy Technology. Although the three functions within the program are discussed as separate subprograms, they are not independent and each is interdependent on the others and cannot exist separately by itself. The close interaction and interdependence and dynamic nature of these three subprograms, make it imperative that some adjustments in funding among the subprograms be permitted throughout the year in order to ensure the most effective program and the best use of overall program funds.

	FY 1982	FY 1983	FY 1984 Request
Physics Research			
Operating Expenses....................	$ 78,000	$ 92,174	$101,500

The Physics Research subprogram includes the direct support of university- and laboratory-based research groups both for the planning, preparation and execution of experiments, and for the analysis, interpretation and dissemination of results. It also supports experimental high energy physics research using data sources and facilities other than accelerators, and the research of university- and laboratory-based theoretical physicists in both phenomenological and formal areas of study.

The goal of high energy physics research is to probe the fundamental nature of matter and energy. Experiments in high energy physics generally require the use of large particle accelerators together with complex detection apparatus to study the products of collisions of high energy particles. The accelerators and experimental facilities are located at three central laboratories where they are accessible to all qualified scientists on the basis of the scientific merit and promise of their proposed research. Although the experiments are performed using the accelerators at the national centers, 75 percent or more of the research is done in a user mode by university-based physicists. Because of the size and complexity of a typical high energy physics experiment, users from a number of institutions frequently collaborate on a given experiment. The resultant research teams typically include a mix of physicists, engineers, technicians, and graduate students. The normal procedure is that an experimental team first conceives and designs the experiment at the home institution. Then a formal proposal is prepared and submitted for review by a Program Advisory Committee of scientific experts and by the management of the appropriate laboratory. If the experiment is accepted for scheduling, the experimental research team proceeds to fabricate, install and test the apparatus at the laboratory involved. There is usually significant interaction and assistance from laboratory staff and support facilities at this stage. The research teams provide manpower for the experiment during the data-taking phase at the laboratory. The recorded data is generally taken back to the home institutions for analysis, interpretation and publication of results. This entire process from conception of the experiment to publication of results usually takes three to five years. U.S. user group involvement in unique experimental opportunities at foreign laboratories such as DESY and CERN is also supported.

Studies of some of the important fundamental problems in high energy physics are now requiring experiments which do not involve the use of high energy accelerators. The new grand unified theories often predict phenomena whose direct observation involve energies far above those presently available from accelerators and also predict effects that can best be observed at very low energies without accelerators but in high precision experiments. While experiments to search for proton decay currently represent the largest of the non-accelerator experimental efforts, there are other experiments, both proposed and operational, including: searches for quarks, magnetic monopoles, and neutrino mass; measurement of neutrino-less double beta decay and the tritium end-point; and investigation of extensive air showers and cosmic ray neutrino interactions. In FY 1984 about $7,000,000 is expected to be devoted to promising non-accelerator experiments.

Theoretical research provides a framework for understanding the results of experimentation and provides suggestions for new measurements to be made. Experiments test existing theory, and experimental results and discoveries often provide the basis for extensions, revisions and modifications of the theoretical framework and understanding. There is thus a strong interdependence of experimental and theoretical research. Because of this interdependence, experimental and theoretical research groups need to work closely together. High energy theoretical research presently has a strong focus on developing a unified description of the forces in nature through generalized gauge-invariant field theories. An increasing trend in theoretical research is the use of large computing facilities to explore numerical solutions of candidate theories which are not amenable to currently available analytic methods, along with the development of more powerful numerical and analytical techniques.

The FY 1984 budget requests $101,500,000 for Physics Research which will support about the same level of effort as in FY 1983. The funds requested are necessary to maintain the strength of the university and laboratory research groups, to provide an adequate match with the planned level of facility utilization and to allow continuation of the substantial non-accelerator high energy physics research programs. Included within this subprogram is the $2,100,000 for the Small Business Innovation Research program mandated by the Congress.

Distribution by Facility

	FY 1983	FY 1984 Request
Physics Research		
Fermi National Accelerator Laboratory (Fermilab)	$ 7,800	$ 9,000
Brookhaven National Laboratory (BNL)	6,500	7,000
Stanford Linear Accelerator Center (SLAC)	9,800	10,300
Argonne National Laboratory (ANL)	4,200	4,500
Lawrence Berkeley Laboratory (LBL)	7,100	7,800
Universities and other agency laboratories	56,774	62,900
Total Physics Research	$ 92,174	$101,500

Fermi National Accelerator Laboratory

$9,000,000 is required in FY 1984 for the support of the Fermilab in-house research effort compared to $7,800,000 in FY 1983. This would sustain a continuing level of effort in the physics research activity by Fermilab scientists taking into consideration the new physics opportunities available with completion of the Energy Saver and early phases of Tevatron II. Most of their research is done in collaboration with university-based groups from across the country and they simultaneously provide a crucial support function for university users of Fermilab. The major lines of research to be pursued by the Fermilab scientists in FY 1984 will be searches for new particles, studies of nucleon constituents, and exploration of the electroweak force through neutrino interactions. The new 1000 GeV accelerator capability resulting from operation of the Energy Saver in conjunction with upgraded and new experimental facilities provided by the Tevatron II project will offer many highly promising new opportunities for research advances.

The constituents of the nucleon will be probed by studying the properties of jets of particles produced with high transverse momentum and by studying the dimuon spectrum resulting from energetic proton-proton collisions on a fixed target. Experiments will also be conducted using the higher energy neutrino beam available from early completion of elements of the Tevatron II project. A major study of the Psi family of particles is planned, using the superconducting "Chicago Cyclotron" magnetic spectrometer, as well as continuation of investigation of the creation of charmed and heavier particles by photons in photoproduction experiments at new record energies. The requested funds also include support for the Fermilab theoretical physics research programs.

Brookhaven National Laboratory

$7,000,000 is required in FY 1984 for the BNL in-house research program, compared to $6,500,000 in FY 1983 to permit about the same level of research as in FY 1982. The research capabilities at the AGS are unique, since no other accelerator covers this range of beam energies. A major emphasis during FY 1984 is expected on the study of the interactions of polarized beams on polarized targets, utilizing this new polarized proton beam capability at the AGS, which is expected to come into operation early in FY 1984. The research efforts on neutrino oscillations and neutrino-electron elastic scattering will continue to receive a major emphasis as well. A complementary program of theoretical analyses of experimental results and other theoretical studies will be pursued.

Stanford Linear Accelerator Center

$10,300,000 is required for FY 1984 compared to $9,800,000 in FY 1983 for support of SLAC physics research groups at a level of effort which reflects some reduction in operation of the fixed-target research program using the SLAC linac to assist in expediting SLC construction.

In FY 1984, PEP is expected to operate at high luminosity and, with the improved initial complement of detectors including the High Resolution Spectrometer and the Time Projection Chamber, provide excellent opportunities for new discoveries. New particle searches and higher precision experiments including particle lifetime measurements will be emphasized. The new SPEAR detector (Mark III) will continue taking data concentrating on high mass states in the Psi region. Increased linac energy, combined with the improved SLAC hybrid spectrometer, will give a unique opportunity for observing the creation of new particles with short decay lifetimes and increased accuracy in measuring such lifetimes. The theoretical program at SLAC studies many aspects of high energy phenomena and the fundamental issues concerning properties of the basic forces, the constituents of matter and the unification of forces.

Argonne National Laboratory

$4,500,000 is requested for the ANL physics research program in FY 1984 compared to $4,200,000 in FY 1983. ANL scientists are primary participants in the operation of the High Resolution Spectrometer (HRS) at PEP, in the data-taking and analysis phases of experiments with HRS, and in the upgrading of this facility. They are involved in preparation for experiments to study 1000 GeV x 1000 GeV proton-antiproton collisions at Fermilab when the Tevatron I comes into operation and are participants in a Fermilab experiment to study jets produced from hadron collisions, which is expected to give information on the quark-gluon interaction. In addition, they will be part of a major effort to observe neutrino oscillations at Los Alamos Meson Physics Facility; are leading a novel search for free quarks; and are major participants in a nucleon decay experiment. The ANL physicists collaborate closely with university research groups in these activities and provide an important technical service base for these groups. The theoretical physics group focuses on the formulation of phenomenological models for strong interactions.

DEPARTMENT OF ENERGY
Energy Supply Research and Development
High Energy Physics
(dollars in thousands)

Project Number	TEC/ TPC	Project Title and Location	Phase	Funds Appropriated To Date 1/	Total Obligations Planned	Total Obligations Actual 2/	Total Cost Planned	Total Cost Actual 2/	Remarks
81-E-218	$82,500/	Tevatron-I	Const.	P&CE $35,589	P&CE $ 85,389	$17,089	P&CE $ 85,389	$6,382	
	$124,357	Fermi National		OPEX $19,338	OPEX $ 38,968	$ 5,558	OPEX $ 38,968	$5,558	None
		Accelerator Lab.							
82-E-206	$49,800/	Tevatron-II	Const.	P&CE $26,276	P&CE $ 52,835	$ 7,469	P&CE $ 52,835	$3,908	
	$67,800	Fermi National		OPEX $ 9,936	OPEX $ 14,965	$ 7,177	OPEX $ 14,965	$7,177	None
		Accelerator Lab.							
84-ER-133	$113,957/	Stanford Linear	Plan.						
	$128,507	Accelerator Center		P&CE $ 1,957	P&CE $115,107	$ 1,957	P&CE $115,107	$1,957	
		Linear Collider		OPEX $ 0	OPEX $ 13,400	$ 0	OPEX $ 13,400	$ 0	None
		Stanford Linear							
		Accelerator Center							

1/ Thru FY 1983.
2/ Thru FY 1982.

Lawrence Berkeley Laboratory

The request provides $7,800,000 in FY 1984 for the LBL research program compared to $7,100,000 in FY 1983. These funds are required for the LBL research groups to maintain a constant level of effort and continue their participation in experiments at PEP, Fermilab and the TRIUMF facility in Canada, as well as some high energy astrophysics. LBL will continue to play a major role in experiments at PEP including their leading role in the use of the Time Projection Chamber and their major role in the Mark II Magnetic Detector. The detailed study by LBL physicists of muon reactions at Fermilab will be entering a new data taking phase at the higher Tevatron energies (near 1000 GeV). The LBL experiment at TRIUMF, which uses polarized muons to search for the effects of a possible new type of vector boson whose existence would invalidate the standard theory of electroweak interaction will be entering its analysis stage. Further running of the experiment is expected in FY 1984.

An important part of the program is the LBL Particle Data Center which provides a valuable service function for the entire high energy physics community. Support for high energy astrophysics experiments in 3 degree Kelvin background radiation, supernovae detection and observation, and studies of compact stellar objects is also planned. These experiments provide important data on elementary processes which complements that of regular high energy physics experiments. Theoretical physics at LBL will continue to emphasize the investigation of the basic particle interactions, the fundamental structure of matter, and topics in accelerator physics.

Universities and other Agency Laboratories

The Physics Research request for FY 1984 provides $60,800,000 for university-based groups and for modest sized research programs at Ames, Los Alamos National Laboratory (LANL), Oak Ridge National Laboratory (ORNL) and Pacific Northwest Laboratories (PNL) compared to $56,134,000 in FY 1983 and includes the $2,100,000 mandated for Small Business Innovation Research compared to $640,000 in FY 1984. This amount is required to permit university-based research groups to participate effectively as users at accelerator laboratories; to mount new forefront non-accelerator experiments; to contribute strongly in the development of innovative research instrumentation required for the next generation of experiments such as solid state detectors and laser streamer chambers; and to make available a few new opportunities for outstanding junior investigators to do independent research.

University physics departments provide a large fraction of the research leadership and also provide the training of future physicists for the national high energy physics program. About three-fourths of the experimental physics research of the high energy physics program is done by the university-based groups, and the remainder by the laboratory-based groups. This balance has resulted in a highly productive national program and is highly beneficial to sustained progress in the program. The Department supports experimental and theoretical high energy physics research groups at over 90 leading universities across the nation, as well as modest efforts at Ames, LANL, and ORNL. The record of success of the program indicates that universities are outstanding centers for developing the innovative and creative ideas required for the success of the program. The subjects of research in the university program run the entire gamut of high energy physics ranging from the most abstract theoretical studies, to phenomenological studies, elementary particle experiments and instrumentation development, and touching upon the interface with astrophysics and cosmology.

Universities are the sources of the next generation of physicists who make essential contributions to near term research progress and who can be expected to provide the required new perspectives, ideas, and innovative leadership for success in the field in the future.

Facility Operations	FY 1982	FY 1983	FY 1984 Request
Operating expenses........................	$124,400	$152,100	$166,000
Capital equipment.........................	40,700	46,372	51,500
Construction..............................	54,600	55,500	89,000
Total facility operations..............	$219,700	$253,972	$306,500

Facility Operations

Facility Operations supports all of the many activities required to operate, maintain, equip and construct the high energy accelerators, colliding beam storage ring facilities, experimental areas, secondary beams, large multi-user detector facilities, and support facilities required for the pursuit of experimental high energy physics research. The funding is divided among the three budget categories shown above.

	FY 1982	FY 1983	FY 1984 Request
Operating expenses........................	$124,400	$152,100	$166,000

The operating expenses portion of Facility Operations provides the accelerator and experimental facility operating crews and support personnel, the electric power, and the expendable materials and services required for these activities, which are concentrated in the three high energy accelerator centers at BNL, Fermilab and SLAC. These laboratories provide over 90 percent of the beam time needed for the research work of the DOE-supported high energy physicists, and of the National Science Foundation (NSF) supported high energy physics experimental research groups as well. The required accelerator and detector facilities are very large, complex and expensive; hence, they are necessarily few in number and are operated as national centers made available to those qualified physicists whose research proposals are of the highest scientific promise and merit.

The complementary sets of capabilities at the three centers provide the essential variety in types of particle beams, particle energy and beam intensity. At Fermilab, the superconducting magnet proton synchrotron provides intense beams of protons with energies up to about 1000 GeV and also provides various types of secondary particle beams of high energy and high intensity for use in fixed target experiments. At BNL, the AGS provides protons with energies up to 30 GeV in the primary beam, high energy polarized proton beams and a variety of secondary beams for use in fixed target experiments. At SLAC, the two-mile linear accelerator delivers electrons up to 32 GeV, positrons up to 21 GeV and some secondary particle beams for use in fixed target experiments. Also at SLAC, the PEP colliding beam facility stores electrons and positrons for collisions up to 15 GeV on 15 GeV and the SPEAR facility provides similar capabilities for collision energies up to 4 GeV on 4 GeV. Both of these SLAC storage rings are filled with electrons and positrons by the linear accelerator.

In FY 1982 and the immediately preceding years the accelerators and colliding beam facilities of the High Energy Physics program operated at low utilization levels in the 35-50 percent range. The utilization level was limited by the total operating and capital equipment funds available and the rapidly escalating cost of electric power resulting primarily from escalating fuel cost adjustments. In FY 1983 the overall utilization of the high energy facilities is planned to be raised to an average level of about 55 percent. The funding request in FY 1984 is required to maintain the overall utilization at about the 55 percent level, thereby permitting a highly productive and effective research program.

Operating Expenses

Distribution by Facility

Facility Operations	FY 1983	FY 1984 Request
Fermilab	$ 72,200	$ 79,400
BNL	31,800	33,600
SLAC/PEP	44,200	49,200
LBL	700	700
Other	3,200	3,100
Total Facility Operations	$152,100	$166,000

Fermi National Accelerator Laboratory

The FY 1984 requirement for Facility Operations for Fermilab is $79,400,000 compared to $72,200,000 in FY 1983. The major new superconducting magnet Energy Saver accelerator will be operated for research during most of FY 1984 at energies ranging up to about 1000 GeV. Operation of the entire expanded sequence of five accelerators at Fermilab in FY 1984 (Cockroft-Walton Preaccelerator, Linac, Booster, Main Ring and Superconducting Energy Saver Ring) will require $47,400,000, with $32,000,000 additional needed for operation of the laboratory's extensive set of experimental laboratories and facilities. Operation of the Energy Saver is planned for about 36 weeks in FY 1984. After a brief initial operating period at 400 GeV, the physics to be achieved will emphasize using the Energy Saver as near its peak energy capability of 1000 GeV as possible. With the accelerator operating for experiments, a variety of secondary beam lines will provide a variety of intense high energy particle beams to the user community for research use, and about 20 different experiments are expected to take data during FY 1984. Major experimental facilities to be operated will include the 15-foot bubble chamber, two major neutrino detectors, the tagged photon spectrometer and the multiparticle spectrometer, a calorimeter to study the production of jets of particles at high transverse momenta, and a massive new magnetic spectrometer with high resolution to search for new kinds of heavy particles which decay into pairs of muons.

Brookhaven National Laboratory

In FY 1984, $33,600,000 is requested for operation of the AGS and associated experimental facilities compared to $31,800,000 in FY 1983. Of this amount, $16,600,000 is needed for accelerator operations and $17,000,000 is needed for experimental facility operations to maintain a 30-week level of machine operation. The FY 1984 operating program is expected to include 15 weeks of slow extracted beam operation, 10 weeks of fast extracted beam operation for neutrino experiments and 5 weeks of polarized proton beam operation. First acceleration of polarized protons by the AGS is expected in FY 1984. The new high energy polarized proton beam will be an important and unique capability not available anywhere else in the world.

Stanford Linear Accelerator Center/Positron Electron Project

$49,200,000 is required in FY 1984 for operation of the SLAC linear accelerator, the PEP and SPEAR colliding beam rings, and their associated experimental facilities compared to $44,200,000 in FY 1983. Of that sum, $23,200,000 is for the operation of the linear accelerator, the SPEAR storage ring, and PEP. This should make it possible to operate the linear and colliding beam rings for 700 shifts, although the delivery rate of electron pulses would be reduced to about 20% of maximum capability. These somewhat reduced levels are the result of giving priority in funding to the effort to expedite SLC construction and anticipated higher electric power rates. The operating levels will be considerably lower at this funding level if SLAC loses its withdrawable electric power allocation from WAPA. SPEAR storage ring operations will continue to be half-time for high energy physics research and half-time for the Stanford Synchrotron Radiation Laboratory, the latter under Basic Energy Sciences support. The high energy physics portion of SPEAR operation will focus on the use of the new Mark III general purpose SPEAR detector for studying properties of the charmed particles. Operation of PEP, which will be at a high level of productivity with high luminosity and a full set of improved detectors, will be given high priority.

The remaining $26,000,000 for SLAC is required to support the experimental areas, detector facilities and the central computer facility. The full initial complement of PEP detectors, including the HRS and Time Projection Chamber (TPC), will be operating in FY 1984. The major SLAC experimental facilities for the fixed target program at the linear accelerator during FY 1984 are expected to be the improved SLAC Hybrid Bubble Chamber Facility and the large spectrometer for extending deep inelastic electron scattering studies.

Lawrence Berkeley Laboratory

The request provides $700,000 for support of LBL's participation in operation of the Time Projection Chamber (TPC) facility at PEP. LBL provides engineers, computer scientists, technicians, and physicists who are primarily responsible for reliable operation of the TPC.

Other

In FY 1984, $3,100,000 is required for special process spares, common use stores and other specialized activities. Funding of common use stores is a new responsibility for the program. There is a particular need in special process spares at Fermilab for spare components for the major new accelerator and cryogenic systems which are being brought into operation. Without adequate spares, component failures could result in major disruptions to the operating schedule.

	FY 1982	FY 1983	FY 1984 Request
Capital Equipment..........................	$ 40,700	$ 46,372	$ 51,500

Capital Equipment funding is required to provide the secondary beam lines, portable shielding, particle detection apparatus and data analysis systems essential to do quality experiments in high energy physics and also is required to provide replacement components for operating accelerator facilities that have worn out or become obsolescent, in order to keep the accelerator and colliding beam facilities operating reliably and efficiently. Capital equipment funds are thus absolutely essential for effective utilization of the major high energy physics accelerator and colliding beam facilities.

A high energy experiment is a large and complex undertaking which requires an ensemble of many beam line and detection components working together as a system. As the research frontier progresses, experiments which can penetrate and advance the frontiers require new and more advanced experimental capabilities. Frontier experiments require higher particle energies, extraction of rare events from large backgrounds, untangling of complex interactions with many produced particles, etc. To maintain a world leading research program which can push the frontiers of knowledge and consistently make new discoveries, the timely introduction of major new capabilities and the regular upgrading and modification of existing capabilities is required. The large scale of high energy facilities requiring capital equipment funding is illustrated by the fact that a typical secondary beam line today will range from several hundred feet to a mile or more in length, with many beam transport and control elements; the portable shielding required around detectors and targets can involve arrays of hundreds of shielding blocks weighing as much as 10 Tons each; the analysis magnets incorporated in detection systems weigh many tons; large calorimeters with weight approaching or exceeding 100 Tons are not uncommon; electronics systems with tens of thousands of data channels are often required.

Specific examples of items of equipment high energy physics needs include beam transport magnets, precision large volume analysis magnets for detector systems, precision regulated power supplies, particle beam diagnostic and control systems, electronic and optical detectors with improved spatial and time resolution, high speed and large volume data processing systems, special cryogenic components for liquid hydrogen targets and superconducting devices, and a host of small standardized electronics and laboratory support equipment.

$51,500,000 is required in FY 1984 to meet the capital equipment needs of the program, with the major needs being at Fermilab and SLAC. At Fermilab the major needs are related to fabricating the new secondary beams and detectors required to implement the 1000 GeV fixed target program offered by Tevatron II which will start becoming operational in FY 1983 and for a large detector for 1000 GeV and 1000 GeV proton-antiproton colliding beam experiments with Tevatron I. At SLAC a major new need is related to upgrading an existing PEP detector for use at the SLC. In order to accomplish these special priorities within the $51,500,000 requested a somewhat reduced overall level of effort is planned for other high energy physics programs.

High Energy Physics

Summary of Capital Equipment by Laboratory

	FY 1984 Request
Fermilab	$ 27,500
BNL	3,500
SLAC	8,200
LBL	1,200
ANL	500
Other agency laboratories (Ames and ORNL)	100
Universities	7,000
Other capital equipment	3,500
Total capital equipment	$ 51,500

Fermi National Accelerator Laboratory

In FY 1984, $27,500,000 is required for capital equipment. One major need ($13,000,000) is for the FY 1984 effort on the new and improved secondary beam lines and detectors which are essential for effective utilization of the Fermilab accelerator complex at the highest energies in the world (near 1000 GeV), which will be available after the completion of the Tevatron II. Another major need is for the detector for 1,000 GeV x 1,000 GeV proton-antiproton colliding beam experiments to be initiated as soon as the Tevatron I becomes operational ($10,000,000). The large complex detector systems require several years to build and must be started early because of the long lead time involved in procurement and assembly of these systems.

Summary of Capital Equipment Request for Fermilab

	FY 1984 Estimate
1000 GeV fixed target experiments	$ 5,500
External beam line improvements and shielding	7,500
1000 GeV on 1000 GeV colliding beam detector	10,000
General equipment for experiments	1,000
Accelerator related equipment items	2,000
General computing equipment	1,000
Technical support and site operations equipment	500
Total	$ 27,500

As is appropriate for a strongly user-oriented laboratory such as Fermilab, much of the capital equipment funding requested is to be used for the fabrication of detection equipment for new experiments, or for the upgrading of existing facilities for higher energy operation. Most of this work contributes directly to meeting the research needs of university users. The emphasis in FY 1984, will be preparation for experiments near the 1000 GeV energy range as elements of Tevatron II become operational. The request for $5,500,000 includes $3,000,000 for nine approved experiments in the Neutrino Area, $1,200,000 for three approved experiments in the Proton Area, $900,000 for approved experiments in the Meson Area and $400,000 for new experiments and general support equipment. The large scale of the Fermilab fixed target experimental areas and their great distances from the accelerator dictated by their high operating energy require unusually long secondary beam transport lines with associated magnets, control systems and shielding, all of which must be provided from capital equipment funds. This need is particularly strong in FY 1984 if the new opportunities provided by the higher energy of Tevatron II are to be exploited. In addition to upgrading several existing beamlines, a number of major new secondary beams have been planned in conjunction with the Tevatron II project, mostly to replace older 400 GeV beams. A total of $7,500,000 is provided for secondary beam equipment. The work in FY 1984 on major new beams will include the muon beam ($900,000), wide band photon beam ($1,500,000), prompt neutrino beam ($1,800,000), polarized proton beam ($400,000) and a new high energy pion beam in the Meson Area ($800,000). The remaining $2,100,000 is for a number of smaller upgrades and modifications. General equipment for the experiments is also needed, including items such as multi-purpose electronic equipment which is managed from a central pool and can be shared by many experimenters, and on-line data acquisition and handling systems.

The major detector for the study of 1000 GeV on 1000 GeV proton-antiproton interactions using the Tevatron I facility, was started in FY 1981 with Departmental funds and substantial support for a Japanese collaboration. In FY 1984, this detector will require about $10,000,000 in DOE funds and an anticipated $2,000,000 Japanese and Italian contribution. The detector is scheduled to be completed in FY 1986 to be ready for operation when the 2000 GeV reaction energy (the highest particle reaction energy ever achieved in the world) becomes available upon completion of Tevatron I. The $10,000,000 included here is intended to cover the FY 1984 funding for all U.S. participants in the detector project, including funds which may be assigned directly to collaborating U.S. laboratories and universities.

Equipment items are required for maintaining the scientific effectiveness of the numerous and complex accelerator systems at the laboratory and for replacement of worn out and obsolete units of the operating accelerator facility. These equipment items include components of the electronic and control, RF, vacuum and cryogenic systems. Also needed is equipment in support of the R&D needs related to the Tevatron I and Tevatron II projects for the development of cryogenic systems, special beam transport lines and new techniques for the antiproton production and accumulation systems.

The Fermilab central computer complex requires the addition of peripheral equipment, both to improve the data acquisition capability and to improve access by users. Small additions to the central computer system to maintain its effectiveness are also included. Technical support and site operations equipment items include machine tools, vehicles, office equipment and site maintenance equipment.

Brookhaven National Laboratory

The FY 1984 request of $3,500,000 for BNL includes $2,700,000 for needs of the ongoing AGS program. These include $700,000 for equipment to keep the accelerator, the beam switchyard and experimental areas operating efficiently and effectively; $700,000 for beam line modifications; $600,000 for detector elements and related hardware for experiments planned by the BNL research groups; $500,000 for components for experiments using the new polarized beam capability; and $200,000 for additions to the experimenters' equipment pool.

The requirements for BNL include $800,000 for the Accelerator and Facility R&D programs. This includes $400,000 for magnet test instrumentation, $300,000 for the cryogenic R&D effort, and $100,000 for minicomputers for monitoring and data collection applications.

Stanford Linear Accelerator Center

The request of $8,200,000 is required in FY 1984 to meet equipment needs related to the SLAC linear accelerator, the SPEAR and PEP storage rings, the associated experimental detection facilities, general service to experiments and the SLAC accelerator research and development programs; and refurbishing of an existing PEP detector for use at SLC.

Of the $8,200,000 requested for SLAC, $1,500,000 is for the Linac and SPEAR programs and general services to experiments includes improvements to the Mark III Detector and micro-beta modification to the SPEAR lattice for increased luminosity ($500,000); improvements to the camera and expansion systems for hybrid bubble chamber spectrometer ($500,000); upgrading of the high energy monochromatic photon beam ($300,000); and general laboratory support equipment ($200,000).

The $500,000 required in support of SLAC's accelerator research and development effort includes equipment needs for improvements in the linac beam, for work on surface physics and superconductivity and for the research and development leading to the possibility of a linear collider.

In FY 1984, $2,200,000 is required for equipment to support PEP and its detector. This amount includes all DOE capital equipment funds dedicated to PEP detectors, regardless of where the fabrication is to be carried out. These funds provide for: improving the TPC with a laser calibration system and direct electron tagging capability ($700,000); improved movable masks to be placed inside the PEP vacuum to reduce background for various individual detectors ($200,000); upgrading of the SLAC on-line data acquisition systems with several mini-type computers ($300,000); upgrading one of the major PEP detectors Magnetic Calorimeter (MAC), High Resolution Spectrometer (HRS) or Direct Electron Counter (DELCO) ($800,000) and general equipment such as electronic pool items and general support equipment for the PEP interaction regions ($200,000).

The request of $4,000,000 in FY 1984 for SLC detection equipment is required for the upgrade of an existing PEP detector to operate effectively at the higher SLC energies to provide a quantitative test of the success of the linac collider concept in providing high luminosity collisions at 100 GeV and to explore physics in the new energy region, concentrating on production of the Z^0.

Lawrence Berkeley Laboratory

A total of $1,200,000 is requested for capital equipment needs at LBL. The physics research program requires $700,000 for the support of ongoing experiments at PEP, Fermilab and TRIUMF, and for general purpose equipment and instrumentation. The advanced accelerator R&D effort requires $500,000 in equipment for further investigations related to the Fermilab antiproton cooling ring and for supporting the R&D program on very high field superconducting accelerator magnets.

Argonne National Laboratory

A total of $500,000 is required for ANL capital equipment needs in FY 1984. This is for support of the ongoing physics research program, including the polarized proton beam experimental setup at Fermilab, a VAX type computer, and detector needs for the neutrino oscillation and proton decay experiments.

Other Laboratories

The FY 1984 request for equipment funding for high energy physics also includes $50,000 for Ames Laboratory for detector components for experiments at Fermilab and the European Center for Nuclear Research (CERN), and $50,000 for Oak Ridge National Laboratory for detector components for the hybrid bubble chamber experiment at Fermilab and for improvements to the spiral reader film measuring machine.

Universities

The $7,000,000 requested for university programs is required for experimental detection and data analysis equipment. These funds primarily support the major apparatus needs of the experimental research programs of the university users for experiments at national accelerator laboratories, and for the needs of non-accelerator experiments on nucleon decay, neutron scattering, neutrino oscillations, double beta decay, high energy astrophysics, magnetic monopoles and neutron oscillations. There are major equipment needs associated with the implementation of experiments using the 1000 GeV Tevatron capability at Fermilab, with U.S. participation in major LEP experiments, and with non-accelerator experiments such as the proton decay searches which are being assembled and operated in deep mines. On-line computer equipment, interfacing components and peripherals, which are an integral part of experimental detector systems, and small computer systems used in scanning, measuring, and data analysis, are to be provided to university experimental groups.

Other Capital Equipment

The High Energy Physics program provides for all the general purpose equipment requirements at BNL. In FY 1984, $3,500,000 is required for this multipurpose equipment, which is essential to the proper, day-to-day operations at the Laboratory. Included are all the needs of the Laboratory's service and support divisions, central scientific computing facility and central shops, as well as equipment required to respond to health, safety, security and environmental needs. It is important that obsolete and worn-out equipment be replaced in order to promote efficient laboratory operations, to increase productivity and to avoid high maintenance costs.

	FY 1982	FY 1983	FY 1984 Request
Construction............................	$54,600	$55,500	$ 89,000

A total of $89,000,000 in construction funding for high energy physics projects is requested in FY 1984. The projects are listed below:

Project	Project No.	FY 1984 Request	Total Estimated Cost
Tevatron I (Fermilab)	81-E-218	$ 20,000	$ 82,500
Tevatron II (Fermilab)	82-E-206	13,000	49,000
Stanford Linear Collider (SLC)	84-ER-133	40,000	112,000
Accelerator Improvement Projects (AIP)	84-ER-131	9,000	9,000
General Plant Projects (GPP)	84-ER-132	7,000	7,000
		$ 89,000	

The construction request includes the continuation of two ongoing Fermilab line-item projects, Tevatron I and Tevatron II and the initiation of the SLC project, at SLAC. These will provide major new capabilities and research opportunities which are vital to the long-range productivity, strength and competitiveness of the United States' program. Also included are funds for improvements and modifications to the existing accelerators, experimental facilities and general laboratory plants which are needed on an annual basis to maintain the efficiency, reliability and scientific effectiveness of the high energy physics facilities and general plant of the laboratories.

Tevatron I

The Tevatron I project at Fermilab, initiated in FY 1981, will provide the facilities needed for a 1000 GeV x 1000 GeV proton-antiproton colliding beam capability. This will be accomplished by producing intense counter-rotating beams of protons and antiprotons which, when brought into collision, will interact with about 2000 GeV of reaction energy, the highest available in the world. Specifically, the project includes: 1) additional refrigeration and radiofrequency accelerating structures so that the Energy Saver ring can operate at 1000 GeV for proton-antiproton colliding beams; 2) an antiproton source; and 3) one large experimental area and one smaller area suitable for detectors to study the results of very high energy proton-antiproton collisions. The project TEC is $82,500,000. The $20,000,000 required in FY 1984 is for construction of a beam overpass, the second experimental area, completion of the antiproton source enclosures which began in FY 1983, and continued work on the antiproton source.

Tevatron II

The Tevatron II project at Fermilab, initiated in FY 1982, will provide the facilities needed for a 1000 GeV (1 TeV) fixed-target experimental program. Specifically, these include: 1) a 1000 GeV beam extraction system; 2) the upgrade of the external beam switchyard to 1 TeV; 3) the provision for 1 TeV beam transport and targetting; and 4) new secondary beam enclosures and support facilities. This project will allow the experimental exploitation of the 1 TeV energy of the superconducting accelerator, and will provide unique capabilities for producing a variety of secondary particle beams at higher energies and intensities than anywhere else in the world. The TEC for the project is $49,000,000, with a scheduled final completion date of FY 1985. The $13,000,000 required in FY 1984 will allow major progress on enclosures for the four new secondary beam lines (the muon, broad-band photon, polarized proton and prompt neutrino beams) and will allow completion of conventional construction upgrading activities in the three existing experimental areas.

Stanford Linear Collider (SLC)

The SLC project at SLAC, to be initiated on a rapid schedule in FY 1984, will provide: 1) an upgrade of the Linear Accelerator (Linac) to 50 GeV capability; 2) systems for producing intense electron and positron bunches; 3) a small storage ring and pulse compressor to increase the density of the positron bunch; and 4) two semicircular arcs of small aperture magnets with appropriate enclosures to bring the electron and positron beams into head-on collisions; 5) special focusing systems near the interaction point, the necessary housing and associated experimental hall and staging area; and 6) the necessary instrumentation and control system for both the Linac and Collider systems.

The SLC project will accelerate beams of electrons and positrons simultaneously in the linear accelerator and then bring them into head-on collision. This system will provide an essential accelerator technology development and demonstration for the new linear collider concept which promises to permit extension of electron-positron reaction energies in a cost effective way beyond the maximum that is practical with circular colliders such as PEP and LEP. In addition, when completed in FY 1986, the SLC will be the first electron-positron colliding beam system in the world capable of achieving an energy of 100 GeV in the center-of-mass system and, as a consequence, should be capable of producing copious quantities of the Intermediate Vector Boson Z^0, one of the predicted carriers of the electroweak force. The study of the Z^0 is one of the major and most exciting areas of physics research indicated by present theories. The project benefits in a major way from the use of the existing 2-mile linac and supporting facilities. The TEC for the project is $112,000,000. The $40,000,000 requested in FY 1984 will allow major progress on the beam line enclosures and other conventional facilities and procurement of critical long lead time items, including material for the arc magnets and klystrons. Additional details are provided in the construction project data sheet entitled "Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC) (Project No. 84-ER-133)."

Accelerator Improvement Projects

A total of $9,000,000 is required for Accelerator Improvement Projects (AIP), to be distributed as follows: Fermilab ($5,100,000); BNL ($2,000,000); and SLAC ($1,900,000). AIP funds are required on an annual basis to provide essential modifications and upgradings of the existing accelerators and colliding beam facilities in order to maintain their scientific effectiveness and to improve their operating economy and efficiency. For an annual cost which is much less than 1% of the U.S. Government's total capital investment in these facilities, AIP funds provide necessary improvements leading to enhanced scientific performance, economies and efficiency of operation, and avoidance of the early obsolescence which is a characteristic of facilities operating in an advanced frontier field of research such as high energy physics.

It is frequently necessary to provide new or modified research capabilities on short notice in order to accommodate the needs of the most important high priority experiments. Because of the rapid advancements of research in high energy physics, these changes are often required on a time scale much shorter than the normal, two-three year budget cycle. AIP funds are essential to permit the rapid and flexible response essential to meet the highest priority needs and maintain a cost-effective, world competitive national research program. Many important experiments with special requirements could not be accommodated in a timely, competitive and cost effective manner without AIP funds.

Since each accelerator and storage ring facility is a unique combination of very specialized, advanced high technology components, there are continuing strong incentives to improve the reliability, efficiency and economy of operation. This is particularly important when savings in electric power costs are involved, where there is frequent opportunity for large savings from a small investment.

There are special needs for AIP funds at Fermilab because of the very large scale and scope of the accelerator, experimental facilities and beam lines, and because of the need to adjust to the new 1000 GeV capabilities now being brought into operation. Additional details on the AIP needs at each of the three accelerator facilities are provided in the construction project data sheet entitled, "Accelerator Improvement Projects, Various Locations (Project No. 84-ER-132)."

General Plant Projects

General Plant Projects (GPP) funds are for maintenance, modification, and improvement of the general laboratory plant at BNL, Fermilab and SLAC. GPP funds are required for projects such as service utilities, support buildings, roads, shops, etc. and, although small compared to the capitalized value of the plant, are essential to keeping it in good and viable operating condition. The FY 1984 GPP request totals $7,000,000 for the following laboratories: Fermilab ($2,500,000), BNL ($3,200,000), and SLAC ($1,300,000). (The high energy physics program provides all of the GPP funding needs for BNL, which is a multipurpose laboratory.) Additional details are provided in the construction project data sheet entitled, "General Plant Projects, Various Locations (Project No. 84-ER-132)."

	FY 1982	FY 1983	FY 1984 Request
High Energy Technology			
Operating Expenses........................	$ 66,800	$ 76,000	$ 82,000

Achievement of the research objectives of the national program requires utilizing some of the largest, most complex and advanced research facilities in the world. The physical domain which can be explored is largely determined by the capabilities of the accelerators, colliding beam devices, detectors, data processing systems and other devices on which the experimental program depends and whose performance is frequently determined by the limits of available technology. The High Energy Physics program supports an extensive advanced technology R&D effort to meet the rapidly evolving and highly specialized needs of experimental physics research for new accelerator and detector capabilities.

Advances in high energy physics research proceed at a rapid pace and technological developments must occur not only in response to the needs of the research but also in anticipation of those needs. It is necessary, therefore, to: pursue a vigorous theoretical research effort into the basic physics and engineering principles underlying the concepts and operation of the instrumentation; conduct forefront research and development in selected, promising areas of advanced technology; and, develop and prove new ideas and concepts and then transform them into devices and techniques of practical use for the physics research.

In this way the Technology R&D enhances the scientific effectiveness, the reliability and the efficiency of existing facilities on a day-to-day basis and also provides for extending the scientific capability of the high energy physics endeavor in a cost effective manner through R&D in support of the design and construction of advanced facilities. In the process, the technology R&D frequently pushes forward or opens up new frontiers in advanced technology.

High Energy Technology is subdivided into two major areas: accelerator R&D and experimental facility R&D. A strong program emphasizing both is essential for the continued progress and vitality of the basic research program in high energy physics and for ensuring that the optimum research capability and productivity are achieved per dollar spent.

Accelerator R&D is concerned with the science and technology fundamental to the accelerators, colliding beam systems, and primary beam transport systems. Its goal is to develop new and improved concepts, techniques and devices for particle acceleration, storage and transport. The end products of accelerator R&D are particle beams of higher energy, increased intensity, longer stored lifetime, greater brightness (more particles per unit transverse beam area), and greater diversity.

Experimental facility R&D is concerned with the targets, secondary beam transport systems, detection apparatus, and data processing systems directly involved in the physics experiments. It focuses on developing new and improved means for generating, splitting, and transporting secondary particle beams; on inventing new types of instrumentation for detecting and studying the characteristics of particle interactions produced in experiments; and on devising advanced data handling techniques for the collection and analysis of data gathered in experiments.

While the purpose and thrust of the technology R&D subprogram is to ensure and extend the technology base vital to the progress of high energy physics research, the results of the R&D effort frequently find broad application in other scientific and engineering disciplines. The following examples illustrate a few of the beneficial spin-offs from high energy physics technology developments. One of the leading centers of expertise in the U.S. in the design of very advanced klystron power tubes for use in high-power radiofrequency systems is at SLAC. Nuclear medicine and cancer diagnostic and therapy work have drawn frequently on particle detection techniques and on experts in high energy physics to produce instrumentation that is safer, more accurate, and reliable. To make the extensive electronics instrumentation used in experiments more cost effective, major contributions have been made in developing standard instrumentation systems, such as CAMAC, which have been accepted worldwide.

The technology R&D effort is concentrated primarily at the five DOE supported national laboratories; however, a small but significant part is also done at universities and by industrial firms. The FY 1984 request of $82,000,000, compared to $76,000,000 in FY 1983 will result in about the same overall level of effort for advanced technology. A strong R&D effort would be maintained at BNL on superconducting magnet design and fabrication techniques, and on alternate collider designs. There would be natural reductions in the effort required at Fermilab as its Tevatron development program moves closer to completion, and at SLAC as construction of SLC is initiated. The following table summarizes the funding requests for the Technology R&D subprogram accordingly.

	FY 1983	FY 1984 Request
High Energy Technology		
Fermi National Accelerator Laboratory	$ 24,000	$ 25,000
Brookhaven National Laboratory	21,500	28,000
Stanford Linear Accelerator Center	20,000	16,500
Lawrence Berkeley Laboratory	5,400	5,600
Argonne National Laboratory	1,100	1,200
Other facilities	4,000	5,700
	$ 76,000	$ 82,000

Fermi National Accelerator Laboratory

A total of $25,000,000 is required by Fermilab in FY 1984 for technology R&D compared to $24,000,000 in FY 1983. Of the FY 1984 request, $19,300,000 is for accelerator R&D and $5,700,000 is for experimental facilities R&D.

The accelerator R&D program will focus primarily on work in support of the Tevatron I and Tevatron II construction projects. For Tevatron I, substantial effort is required for continued studies of stochastic cooling techniques required to obtain an intense source of antiprotons, including fabrication of hardware for the accumulation ring, and in antiproton production and collection techniques to ensure the highest performance of the facility. Accelerator R&D in support of Tevatron II will emphasize studies in support of new beam lines to best utilize the new Fermilab 1000 GeV capability. R&D studies will also be pursued on the performance of superconducting magnets in a high radiation environment and on beam stability in a cold vacuum system.

The R&D associated with the effort to improve the performance of the base accelerator complex will include, in FY 1984, studies of means to enhance the accelerated beam intensity and stability in the superconducting ring, and will address any difficulties which might arise in its early years of operation. An increased beam intensity would greatly benefit the physics productivity of the fixed target research program, and would also increase the rate of antiproton production for the collider by reducing the antiproton collection time from the present design value of 5 hours, thereby increasing luminosity and research performance. Theoretical and experimental studies will continue in order to improve the understanding of the basic accelerator physics of the superconducting ring, which directly impacts the performance of the colliding beams for Tevatron I and the extracted beams for Tevatron II. There will also be some R&D on very high field superconducting magnets and on advanced beam cooling techniques.

In the experimental facilities R&D program, there will be continuing work on the development of superconducting beam transport systems and on improved particle detectors for higher energy fixed target research, as Fermilab begins to exploit the 1000 GeV research capability made available by Tevatron II. Research and development in support of the preparation of the CDF detector for Tevatron I colliding beam experiments will continue in FY 1984.

Brookhaven National Laboratory

The FY 1984 request includes $28,000,000 for technology R&D at BNL compared to $21,500,000 in FY 1983. This includes $5,000,000 for BNL in support of the 30 GeV AGS program. This includes accelerator R&D to continue improving the AGS operating effectiveness, and special efforts to bring the new polarized proton beam capability of the AGS quickly into effective operation. AGS-related experimental facility R&D will concentrate on new detector and beam line developments required to sustain the forefront character of the experimental program.

The remaining $23,000,000, compared to $18,000,000 in FY 1983, is requested to continue the CBA R&D program to develop accelerator quality superconducting magnets, to develop and demonstrate techniques for fabricating these magnets in a reliable and cost effective manner, and to pursue alternate magnet and facility designs which might lead to a lower cost major facility. It is envisioned that these studies would form the basis for a major new high energy collider facility. A decision to proceed with this future major facility, to be available by the end of the decade, will be based on the results of the R&D studies, on overall program requirements and on budget considerations.

Stanford Linear Accelerator Center

A total of $16,500,000 is required for FY 1984 for technology R&D at SLAC, compared to $20,000,000 in FY 1983. The reduction in R&D funding reflects the initiation of SLC construction. Of this amount, $10,500,000 is for support of accelerator R&D and $6,000,000 is for experimental facility R&D. In FY 1984, a major part of the accelerator R&D ($7,000,000) at SLAC will be used for continued development of the linear collider concept and in support of the SLC construction effort. In addition, PEP-related accelerator R&D will be directed toward improvements in reliability and operating efficiency, increased intensity of stored beams and higher luminosity of beam interactions.

The FY 1984 accelerator R&D studies will focus principally on issues connected with the SLC, which requires accelerating very intense pulses of electrons and positrons simultaneously in the linear accelerator, and then bringing them into collision in a manner that would provide very high interaction energies and high interaction luminosities. Special areas of study include developments to increase the linac energy to 50 Gev; methods for enhancing positron beam intensity; problems of stability of high current beam pulses in the linac during acceleration; beam transport in the two semi-circular arcs of magnets to be used to bring the electrons and positrons into head-on collision; and methods to control the collisions of the very high intensity electron and positron beam pulses.

Other accelerator R&D activities at SLAC will include development of superconducting radiofrequency cavities, development of very high power pulsed klystrons, theoretical and experimental studies of linear accelerator systems, development of sophisticated beam instrumentation and control devices, and development of special new beam transport systems.

Experimental facility R&D at SLAC in FY 1984 will be directed primarily toward design of advanced detectors for future experiments at PEP and the SLC. Some R&D supporting continued research on the SPEAR electron-positron storage ring and on fixed target research is also included.

Lawrence Berkeley Laboratory

A total of $5,600,000 is required in FY 1984 for technology R&D at LBL, compared to $5,400,000 in FY 1983. Of this amount, $3,800,000 is to be used to support advanced accelerator R&D, consisting predominantly of studying very high field superconducting magnets for future applications and collaborative studies on further development of stochastic cooling techniques to be used on the Fermilab Tevatron I project. The LBL work on superconducting magnets ranges from studies of materials, exploration of fundamental concepts, and testing special techniques to fabricating and testing specific magnet designs. LBL is emphasizing development work related to very high field (10 Telsa or greater) superconducting magnets.

In addition, $1,800,000 is required to support experimental facilities R&D at LBL in FY 1984. This represents a somewhat reduced level of effort with respect to FY 1983. R&D tasks covered include development of a new hadron calorimeter for proton-antiproton experiments at Fermilab; studies of advanced detectors for use with linear colliders in collaboration with SLAC; work to improve the performance of experimental apparatus at SLAC/PEP and Fermilab; and long range instrumentation and detector development.

Argonne National Laboratory

A total of $1,200,000 is required for High Energy Technology for ANL for FY 1984, compared to $1,100,000 in FY 1983. Of that amount, $500,000 is for accelerator R&D and $700,000 is for experimental facilities R&D.

The high energy accelerator R&D at ANL for FY 1984 is expected to be directed primarily towards collaborative work with Fermilab on design and development for the Tevatron I proton-antiproton capability, including particle cooling techniques and beam transport.

Experimental facilities R&D is expected to concentrate on research and development for new types of particle detectors; further improvements to the High Resolution Spectrometer at PEP; contributions to the colliding beam detector for the Fermilab Tevatron I project, and the development of new types of polarized targets.

Other

In FY 1984, $5,700,000 is requested to support special technology R&D in universities and industry, compared to $4,000,000 in FY 1983.

The work carried out under this part of the technology R&D subprogram covers a very broad range of topics, including superconducting materials, instrumentation standards, new particle detectors, theoretical studies in charged particle beam dynamics, and new accelerator concepts. In recent years a significant part of this effort has been directed at basic studies related to new accelerator concepts. The critical importance of an enhancement of accelerator R&D was stressed by the recent High Energy Physics Advisory Panel's Subpanel on Accelerator Research and Development, which was endorsed by the HEPAP Subpanel on Long Range Planning for the U.S. High Energy Physics Program and strongly endorsed by HEPAP itself. Representative lines of research include collective methods of particle acceleration, laser acceleration of electrons, theories of nonlinear dynamics, collective effect and space charge phenomena, very high radio-frequency accelerator systems, high power radio frequency sources, and very high field superconducting magnets.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
General Science and Research
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

3. Date PE&D initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 4th Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $41,500
Less amount for PE&D: 0
Net cost estimate: $41,500
Date: 5/81

6. Current cost estimate: $82,500
Less amount for PE&D: 0
Net cost estimate: $82,500
Date: 5/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1981	$ 2,000	$ 2,000	$ 2,000	$ 1,211
1982	18,000	14,100	14,100	4,182
1983	18,000	18,000	18,000	21,000
1984	20,000	20,000	20,000	22,400
1985	22,000	22,000	22,000	23,000
1986	2,500	6,400	6,400	10,707

8. Brief Physical Description of Project:

This project provides for:

1. the modification of the Energy Saver superconducting accelerator ring so that it can be used as a 1 TeV proton on 1 TeV antiproton colliding-beam storage ring;
2. two experimental areas to provide facilities for simultaneous high energy physics experiments; and
3. the construction of an antiproton production, cooling and accumulation system.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

8. Brief Physical Description of Project (continued):

To operate the superconducting Energy Saver ring near the full energy of 1 TeV requires additional satellite refrigerators because superconductors, as they approach full magnetic field, will make the transition from the superconducting to normal state with decreasing amounts of energy deposited in them. Thus, extra cooling will prevent quenches of the superconducting ring at full energy. To simultaneously accelerate and store protons in one direction and antiprotons in the opposite direction, and to optimize the collision configuration, requires additional rf cavities and other special devices.

Two experimental areas to house high energy physics colliding beam detectors will be an integral part of the Fermilab Main Ring tunnel. The design of the experimental areas will allow the rapid and efficient introduction of large detectors into the beams. To accomplish this, there will be separate detector assembly areas. The civil construction which requires the Main Ring to be shut down will be done as much as possible concurrently with the final installation of the Energy Saver, thus minimizing the need for additional accelerator shutdowns. The project also provides an overpass for the conventional magnet ring, to detour it around the detector at one of the experimental areas.

The Fermilab scheme for production and collection of antiprotons uses the present accelerators plus two additional new storage rings. The first of these is the debuncher ring, operating at about 8 GeV energy, which will have a large acceptance for antiprotons and will be used to debunch the beam as it comes from the antiproton production target. The second ring is the accumulator which will be used for cooling of the antiproton beam after it emerges from the debuncher, and for accumulating the antiprotons. The term "cooling of a particle beam" means reducing the energy spread of the beam. This cooling is particularly important for producing an accelerator quality beam from the dilute beam of secondary antiprotons emerging from the target. The accumulator will collect the antiprotons from about ten thousand targeting cycles. It then increases their density by stochastic cooling until the antiproton beam is intense enough to transfer into the Energy Saver ring, where it will be brought into collision with a counter-rotating proton beam. The project includes construction of the debuncher ring, the enclosures for the two rings, associated beam transport enclosures and the target station.

The research detectors required for experiments will be funded as capital equipment items. The major detector is being fabricated over the five-year period from FY 1981 through FY 1985. Substantial participation and financial assistance is being contributed by the Japanese, under the United States-Japan Implementing Agreement on Cooperation in High Energy Physics. The DOE funding contribution for this detector over the five years is currently planned to be about $30,000,000.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois
2. Project No. 81-E-218

9. Purpose, Justification of Need for, and Scope of Project

When protons and antiprotons are stored in the superconducting ring and brought into collision, the reaction energy available for particle production will be about 2000 GeV. This is almost 50 times greater than the 43 GeV reaction energy which will be available at Fermilab when 1000 GeV protons strike a fixed target, although the interaction rates of the colliding beams are much lower than that of the fixed target program.

This reaction energy is expected to be sufficiently high to produce the predicted, but as yet unobserved, intermediate vector bosons. This family of particles is presumed to be the carrier of the weak force. A phenomenological description of this force was first made nearly fifty years ago by Enrico Fermi. Attempts to put this description on a more quantitative basis led to the postulate of the existence of these particles. The data from experiments done at Fermilab and at other high energy accelerators have shown that the proton behaves as though it were made up of constituent particles called quarks. The very high energies available in collisions of protons with antiprotons at the Tevatron will permit experiments which will greatly enhance our understanding of the nature of subnuclear constituents. There are tantalizing hints of completely new phenomena at reaction energies of about 500 GeV. At present, these indications emerge from the observation of a handful of unusual cosmic ray events which have been accumulated during years of intensive work. The frequency of collisions of colliding beams with Tevatron I will duplicate these results in a matter of minutes.

These are some of the scientific reasons why extending particle physics to these much higher reaction energies is of immense scientific value. The most compelling reason, however, is the likelihood of discovering totally unexpected phenomena at this new world record reaction energy.

10. Details of cost estimate

		Item Cost	Total Cost
a. Engineering, design and inspection at 25% of construction costs			$13,750
b. Construction costs			55,000
1. Conventional construction		$22,500	
a. Experimental areas	$ 8,700		
b. Ring and beam line housing	13,800		
2. Special facilities		32,500	
a. Antiproton source	17,700		
b. Accelerator components	14,800		
c. Contingency at 20% of above costs			13,750
Total			$82,500

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

11. Method of Performance

Design of facilities will be by the operating contractor and subcontractors as appropriate. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding:							
1. Total facility costs:							
(a) Construction line item	$1,211	$ 4,182	$21,000	$22,400	$23,000	$10,707	$ 82,500
Total facility costs	$1,211	$ 4,182	$21,000	$22,400	$23,000	$10,707	$ 82,500
2. Other project funding:							
(a) Direct R&D operating costs necessary to complete construction ...	2,221	3,337	13,780	15,470	2,860	1,300	38,968
(b) Capital equipment in support of R&D ...	621	368	500	700	500	200	2,889
Total other project funding	$2,842	$ 3,705	$14,280	$16,170	$ 3,360	$ 1,500	$ 41,857
Total project funding (Items 1 & 2)..	$4,053	$ 7,887	$35,280	$38,570	$26,360	$12,207	$124,357

b. Total related incremental annual funding requirements (estimated life of project: 20 years)	
1. Facility operating costs..	$ - 3,000*
2. Programmatic operating expenses directly related to the facility................................	2,500
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	3,000
4. GPP, AIP programmatic costs..	500
Total other related annual funding requirements...	$ 3,000

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* Reference Item 13. b. for explanation.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois   2. Project No. 81-E-218

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a Total project funding:

1. Total facility costs

(a) Construction line item - explained in items, 8, 9 and 10.

2. Other Project Funding:

(a) Direct R&D operating costs - Studies of stochastic cooling techniques will continue. R&D on the antiproton production target system and the accumulator ring are now in progress. R&D on other elements of the project, to optimize performance and minimize the costs of various subsystems, will continue through the late stages of construction.

(b) Other project-related costs - The items included in these costs are magnets, power supplies, electronics and other general equipment to support a.2(a) above.

b. Total related annual funding requirements - It is assumed that approximately one-half of Fermilab accelerator operations time will be for colliding beams. This means that the fixed target experimental areas will not be operating one-half of each year. During the colliding beam operating period, there will be a net reduction of power consumption at Fermilab of about 15 Megawatts compared to running full time for fixed target experiments, which corresponds to a savings of about $3,000,000 over six months at current power rates. The programmatic effort in the facility will require approximately 30 additional people, and additional material and supplies are required to effectively operate the facility. The acquisition of research detectors for Tevatron I will be made with capital equipment funds. In the future, it is anticipated that major detector upgrades will be fabricated about every three years, each with an estimated capital equipment cost of about $9,000,000. GPP and AIP funds will be required as experience in operating the new antiproton source and utilizing the Energy Saver as a storage ring indicates specific areas where improvements would be most beneficial.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $49,800
Less amount for PE&D: 800
Net cost estimate: $49,000
Date: 5/81

6. Current cost estimate: $49,800
Less amount for PE&D: 800
Net cost estimate: $49,000
Date: 9/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1982	$ 6,000	$ 6,000	$ 6,000	$ 2,439
1983	18,000	18,000	18,000	18,787
1984	25,000	13,000	13,000	14,142
1985	0	12,000	12,000	13,632

8. Brief Physical Description of Project:

This project completes the program to upgrade Fermilab's accelerator and experimental facilities for 1000 GeV research capability. It provides necessary facilities for a 1 TeV (1000 GeV) fixed target experimental program in existing areas to fully exploit the higher energy of the superconducting accelerator, the TEVATRON. The elements of this project are:

a) The construction of an extraction system for 1 TeV protons.

b) The upgrade of the external beam switchyard to 1 TeV and the provision for 1 TeV targeting in the present external experimental areas.

c) The construction of new secondary beam enclosures and support facilities in each external experimental area in order to exploit the fixed target physics opportunities of the TEVATRON. Some of these new beam lines will replace existing beams.

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

8. Brief Physical Description of Project - (continued):

This project provides for the installation of the electrostatic septa, septum magnets, kicker magnets and other specialized components needed to extract the 1000 GeV protons into the beam branching switchyard. Provision will be made for slow resonant extraction (1 to 10 secs.) which is required for electronic detector systems and for the fast resonant extracted beam (1 to 3 milliseconds), which is preferred for neutrino experiments.

Additional septa, bending magnets, focusing magnets and ancillary components which are necessary to transport the 1 TeV protons to the three external experimental areas are also included. The target stations and experimental facilities of all three areas will be modified to optimize the handling of the 1 TeV proton beams and to exploit the unique physics opportunities they present. Ancillary storage and materials handling capability will be provided for the improvement of efficiency and flexibility in the conduct of experiments. The requisite secondary beam line equipment and experimental detectors will be provided through the capital equipment budget.

The Fermilab 1 TeV accelerator will provide a unique opportunity for producing secondary particle beams at higher energies and intensities than anywhere else in the world. The Tevatron fixed target program will give Fermilab international leadership for many years. It will be possible for scientists to use this facility to study many new phenomena involved in the fundamental interactions of matter. Study of these phenomena is at the heart of increasing our understanding of the most basic processes of matter. The components for the new secondary beam lines and the new and upgraded research detectors required to implement the initial Tevatron II research program will be acquired as capital equipment items during the FY 1983 through 1985 period.

9. Purpose, Justification of Need for, and Scope of Project

The collision of 1 TeV protons with nuclear targets will provide an intense source of muons, electrons, neutrinos, mesons, and baryons with which to study the emerging pictures of the weak, electromagnetic and strong interactions of the fundamental constituents of matter. In each of the three existing external laboratories at Fermilab, many new research opportunities will be possible at 1 TeV. The gain in the event rate of energetic interactions, and the increase in the energy and intensity of the planned muon beam, will allow detailed measurements of the quark structure functions of protons and neutrons and sensitive tests of predictions of the energy dependencies, according to the theory of quantum chromodynamics (QCD). The careful measurement of high energy neutrino interactions will test the unified description of the weak and electromagnetic interactions of leptons, including the predicted damping of the total cross sections due to the postulated intermediate vector boson.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois
2. Project No. 82-E-206

9. Purpose, Justification of Need for, and Scope of Project - (continued):

The production and study of heavy quarks is greatly enhanced at higher energies. The combination of high energy and advanced detector technology makes it possible to study particle lifetimes as short as 10^{-13} seconds. The studies of the strong interaction dynamics of quarks will be enhanced by the increased energies available in hadronic interactions, as well as the improved duty cycle of the TEVATRON which permits greater average secondary beam intensities. Better measurements of fundamental hadron properties, including those related to particle jets and polarization, can be made at higher energies. The increased fluxes open new domains in the study of high transverse momentum interactions. These studies of high transverse moments, which probe the structure of matter at very small distances, will be crucial in the determination of the detailed dynamics of quark and gluons.

The TEVATRON fixed target program can be expected to discover new subnuclear phenomena. The Higgs boson, a required particle in present field theories, may be found in dilepton searches. It is also possible that the top quark may be observed in neutrino interactions.

10. Details of Cost Estimate*

		Item Cost	Total Cost
a. Engineering, design and inspection at approximately 19% of conventional construction costs (special facilities EDIA included in special facilities construction costs item b. 2)			$ 3,300
b. Construction costs:			37,900
1. Conventional Construction of Beam Enclosures, Laboratories, etc.		$17,000	
2. Special Facilities		20,900	
a. Switchyard Area Upgrade	5,200		
b. Meson Facilities Upgrade	5,100		
c. Neutrino Facilities Upgrade	5,900		
d. Proton Facilities Upgrade	4,700		
c. Contingency at approximately 19% of the above costs			7,800
Total Project Cost			$49,000

* Based on Completed conceptual design, and partial Title I design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

11. Method of Performance

Design of facilities will be by the operating contractor and subcontractor as appropriate. To the extent feasible, construction, procurement and installation will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

12. Pending Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding						
1. Total Facility Costs						
a. Construction line item	$ 0	$ 2,439	$18,787	$14,142	$13,632	$49,000
b. PE&D	800	0	0	0	0	800
Total Facility Costs	$ 800	$ 2,439	$18,787	$14,142	$13,632	$49,800
2. Other Project Funding						
a. Direct R&D operating costs necessary to complete construction	3,672	3,505	2,759	2,835	2,194	14,965
b. Other project related costs	35	634	806	800	760	3,035
Total Other Project Funding	$3,707	$ 4,139	$ 3,565	$ 3,635	$ 2,954	$18,000
Total Project Funding (Items 1 & 2)	$4,507	$ 6,578	$22,352	$17,777	$16,586	$67,800

b. Total related incremental annual funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 2,000
2. Programmatic operating expenses directly related to the facility	3,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	4,000
4. GPP, AIP programmatic costs	1,000
Total Other Related Annual Funding Requirements	$10,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

1. See details of cost estimate, item #10.
2. Other project funding

a. R&D operating costs: A program of development is underway to adapt Energy Saver dipole and quadrupole magnets and refrigeration systems to the existing physical plant in the Meson, Neutrino and Proton areas. The target handling and muon shielding requirements associated with 1 TeV energies are also being studied. Further studies are being undertaken to increase the intensity capabilities of the Tevatron accelerator in order to further improve the research potential of the 1 TeV fixed target program.

b. The items included in these costs are magnets, power supplies, cryogenics, and electronics which are general equipment to support the R&D costs referred to above.

b. Total related incremental annual funding requirement - The external experimental areas (Meson, Neutrino and Proton) will operate about one-half of each year, with one-half devoted to colliding beams. The increased facility usage and the more complex character of experiments at high beam energies and intensities will result in increased programmatic R&D and experimental facility operating costs. The Tevatron fixed target program will require an increase in the annual equipment budget to accomodate its greatly increased secondary beam energies, requiring more extensive and complex beam line equipment as well as larger new research detectors and experimental facilities. GPP and AIP funds needed will follow closely the experience of the existing 400 GeV program, with consideration of the increased scale and complexity of a 1000 GeV operating facility.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
General Science and Research
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC)

2. Project No. 84-ER-133

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3. Date PE&D initiated: 2nd Qtr. FY 1980

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $113,957,000
Less amount for PE&D: 1,957,000
Net cost estimate: $112,000,000
Date: 5/82

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7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$112,000	$ 40,000	$ 40,000	$ 30,000
1985	0	50,000	50,000	46,000
1986	0	22,000	22,000	36,000
Total	$112,000	$112,000	$112,000	$112,000

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC) 2. Project No. 84-ER-133

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8. Brief Physical Description of Project:

The SLAC Linear Collider (SLC) is a new type of electron-positron colliding beam facility which promises not only to reduce the cost of very high energy colliding beam devices but also to extend the upper limit in energy above that which is at present technically and fiscally feasible. Its operation is based on the acceleration of a single intense positron bunch and a single intense electron bunch to energies of approximately 50 GeV each. At the end of the linac, the two bunches are injected in opposite directions into a ring of magnets, arriving at a collision point where an effective interaction energy of approximately 100 GeV is achieved. After the collision, the particles are disposed of and not used again. Because the beam is used only once, the magnets in the ring can have small aperture and, hence, low cost. Compared to storage rings, the single pass collider system operates at a relatively low repetition rate (180 Hz in the system proposed here) but makes up for the low collision frequency by the extremely high current densities which can be tolerated at the collision point.

The main components of the SLC are the energy upgrade of the SLAC linac; a transport system from the end of the linac to the small aperture magnet ring; the magnet ring itself which includes the special focusing systems required near the interaction point; the necessary beam housing; an experimental hall and staging area; a high power positron production target; a positron booster; a transport system from the positron target at the 2/3rd point of the linac back to the injection end of the linac; a new high peak current electron gun; two small storage rings to reduce the emittances of the electron and positron beams by radiation damping; pulse compressors to reduce the length of the bunches in the storage rings before injection back into the linac; and the necessary instrumentation and control systems for both the linac and the collider system.

Since the SLC involves a new type of colliding beam system, its operation and the function of the various components are described below. A bunch of positrons containing approximately 5×10^{10} particles is injected into the SLAC linac. The SLAC linac is to be upgraded as part of this project to give a final energy of approximately 50 GeV. A single intense electron bunch, also of 5×10^{10} particles, is injected into the linac approximately 20 meters behind the positron bunch. A second electron bunch is injected behind the first intense electron pulse. This second electron bunch is used for the production of a new positron bunch. The first two bunches are accelerated in the linac to an energy of about 50 GeV. At the end of the linac a splitter takes the leading intense positron and electron bunches and starts them around the final ring in opposite directions. After each bunch travels halfway around the ring, they come to the collision area where a collection of special lenses focuses the beams to spots of about 2 micron radius at the collision point. After the beams pass through each other at the collision point they are disposed of and not used again.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC)

2. Project No. 84-ER-133

8. Brief Physical Description of Project - (continued):

The second electron bunch which travels down the linac behind the intense electron-positron bunches is deflected out of the linac at the 2/3rd point and is directed onto a positron production target. Positrons from this production target are boosted to an energy of around 0.2 GeV by a short section of linac and transported back to the injector end of the main linac where they are boosted to an energy of approximately 1.2 GeV and put into a damping ring. In the damping ring the size of the beam decreases by synchrotron radiation damping to the appropriate value for re-injection into the main linac. The damping time will be longer than the approximately 5 msec's between pulses of the collider system and, therefore, this ring must store two bunches of positrons. The bunch which has been stored for the longest time is the one which is ejected from the damping ring and injected into the linac for the next pulse. The electron gun is pulsed slightly later than the time at which the positron beam arrives at the injector. The first 100 meter section of the linac accelerates both electron bunches to 1.2 GeV for insertion into the electron damping ring. At the time of the next main linac pulse, the electron and positron bunches are ejected from their damping rings, compressed to a bunch length of 1 to 2 mm and injected into the linac. The cycle repeats at 180 Hz. The design luminosity for electron-positron interactions is 10^{30} $cm^{-2}s^{-1}$.

9a. Purpose and Justification of Need for Project:

The SLC has two goals. First, it will develop and serve as the first test of a new colliding beam technique to achieve electron-positron collisions at much higher center-of-mass energies at lower cost per GeV than the technology used up to now -- that of the Colliding Beam Storage Rings (CBSR); and second, the SLC will increase the center-of-mass energy available for physics experiments with the electron-positron system by a factor of about three above that now available at existing CBSR's. The lower cost of the SLC itself is achieved by virtue of the fact that it uses the existing 2-mile linac.

The highest energy CBSR's now in existence are the PEP Project at Stanford and PETRA at Hamburg, West Germany with center-of-mass energy of around 30-40 GeV. The next step in CBSR technology is the LEP machine, now being built by CERN physicists and engineers, which will achieve a maximum center-of-mass energy as high as 140 GeV with conventional rf and 240 GeV with superconducting rf, if that technique should prove practical. The version with conventional rf is estimated to cost about 1,000 million Swiss Francs in 1981 value not including labor costs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Accelerator Center (SLAC)
Linear Collider (SLC)

2. Project No. 84-ER-133

9a. Purpose and Justification of Need for Project - (continued):

In order to make use of the single existing linac at SLAC, the SLC has two arcs of magnets to guide the linac bunches to the collision point. At energies below about 70 GeV per beam the synchrotron radiation emitted in these magnets has a negligible effect on the total power required to operate the facility, while allowing the facility to be based on a single linac rather than two linacs. This project will not only pioneer a new accelerator technology which promises to reduce costs for future generation of e+e- machines, but will also contribute to a better understanding of the physical world through the experiments to be done using it.

Electron-positron colliding beam experiments over the past seven years have been outstandingly productive. Much of what has been learned in the last few years about the properties of new quarks, mesons, leptons, and jets has come from these experiments. New electron-positron colliding beam machines designed to extend to higher energy the study of the world of quarks and leptons via the electromagnetic interaction are now being planned or are coming into construction. The SLC is designed to expand the horizon of this world and to allow study of both known particles and those predicted to exist, by means of their production via the weak, as well as the electromagnetic, force.

From recent research, a new theoretical concept has emerged which interprets both the weak and electromagnetic forces as different manifestations of one basic force. This concept is known as the gauge theory, the simplest form of which is the "standard model" of Weinberg and Salam. All of the variants of the gauge theory have one or more heavy particles which interact with the electron-positron system in the same basic way as does the ordinary zero mass photon. It is the interaction of this heavy gauge particle (Z^0) and its charged companions that is responsible for the properties of what is called the weak interaction. The gauge theories have had such success in explaining apparently unrelated facts that they are generally believed to be correct. Should the SLC show that the (Z^0) particle does not exist, the physics implications would be profound as this otherwise successful throng would have to be abandoned.

1. Title and location of project: Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC)

2. Project No. 84-ER-133

9a. Purpose and Justification of Need for Project - (continued):

The SLC is designed to have a total energy large enough to produce the neutral gauge particles. When the energy of the colliding beams matches the mass of the neutral gauge boson, (Z^0), as is the case for SLC, it will be copiously produced, resulting in many hundreds of events per hour. The decay of these Z^0's into quarks, leptons, and perhaps other more exotic particles, will give a vast amount of information about a broad spectrum of basic physics questions ranging from the number of elementary building blocks which make up our world, to the possible relation of the strong interaction to the weak and the electromagnetic, to the conditions in the early universe when it was only a few seconds old.

The gauge particles may be found by other machines which come into operation earlier than SLC (the antiproton-proton collider at CERN, for example), but experiments on these other machines can give only a small fraction of the important information which can only be obtained from an electron-positron machine.

The need for the project has recently been emphasized in the report of the Subpanel on Long Range Planning of the High Energy Physics Advisory Panel (HEPAP) of the DOE (report #DOE/ER-0128, January 1982), and unanimously endorsed by HEPAP itself. The subpanel report states:

> "SLC construction serves two purposes. First, SLC represents a dramatic advance in the field of particle accelerators, which provides for a thorough investigation and demonstration of the technology of the collision of micron-size electron and positron beams. Such an investigation is a crucial step in the design of very high energy linear colliders for the next decade. The second purpose is to carry out the early exploration and systematic study of the very rich and important Z^0 decay modes and of the associated electroweak physics. The Subpanel feels that it is important that these purposes be achieved as early as possible and, therefore, recommends construction authorization in FY 1984."

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Accelerator Center (SLAC)
Linear Collider (SLC)

2. Project No. 84-ER-133

9b. Scope of the Project

Since the SLC is a new type of colliding beam device, there are some uncertainties in the final performance level of the machine. The HEPAP subpanel notes some of the factors which could lead to lower than design reaction rate, as well as some possibilities for higher than design performance. Many of these factors are such that tests with the full facility are required for their evaluation. We have, therefore, restricted the conventional facilities for the project and the scope of the initial physics detector facilities to the minimum required to develop the linear collider technique and to explore the physics potential.

The beam housing and the experimental area have been designed to accommodate a single collision point for the beams. However, provisions have been made to allow the future addition of a second collision point with minimum down time and cost if that should become desirable.

Funding for detection apparatus to be used for high energy physics experiments with the SLC will be included in the capital equipment budget. The initial equipment funds will be used to upgrade an existing detector now used for lower energy experiments at PEP. As the ongoing R&D program gives a better feeling for the ultimate performance of the SLC, it may become desirable to request additional funds for a detector with broader capability.

10. Details of Cost Estimates:

	Item	Total Cost
A. ED&I (Excludes previously funded Plant Engineering & Design ED&I) @ 13% of construction costs		$10,500
B. Construction Cost:		$82,400
1. Site Work	400	
2. Utilities	500	
3. Structures, including a) Experimental Hall, b) Collider Housing, and c) Linac-Collider Connection Tunnels	29,000	
4. Accelerator components: a) Electron and Positron Sources; b) Energy Upgrade; d) Collider Arcs; and d) Focusing, Damping and Control Systems	$52,500	

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Accelerator Center (SLAC)
Linear Collider (SLC)

2. Project No. 84-ER-133

10. Details of Cost Estimates - (continued):

	Total Cost
C. Standard Equipment (Cranes)	$ 600
D. Contingency @ approximately 20% of above cost	18,500
E. Total	$112,000

11. Method of Performance

Design of conventional facilities will be accomplished by subcontracts. Design of technical components will be by the operating contractor (SLAC). To the extent feasible, construction procurement and installation will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC)

2. Project No. 84-ER-133

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	FY 1986	Total
A. Total Project Funding:					
1. Total Facility Funding:					
(a) Construction Line Item	$ 0	$30,000	$46,000	$36,000	$112,000
(b) PE&D	1,957	0	0	0	1,957
(c) Expense Funded Equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Subtotal Facilities Funding	1,957	30,000	46,000	36,000	113,957
2. Other Project Funding:					
(a) R&D Necessary to Complete Construction	0	7,000	3,900	2,500	13,400
(b) Other Project Related Funds:					
(1) R&D Related Capital Equipment & Plant	0	500	400	250	1,150
Subtotal Other Project Funding	0	7,500	4,300	2,750	14,550
Total Project Funding	$ 1,957	$37,500	$50,300	$38,750	$128,507

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Accelerator Center (SLAC)
Linear Collider (SLC)

2. Project No. 84-ER-133

B. Total Related Funding Requirements (Estimated life of project: 10 years)

1. Facility operating costs (incremental power costs)...	$ 3,900
2. Programmatic operating expenses directly related to the facility	5,200
3. Capital equipment not related to construction but related to the programmatic effort in the facility	500
4. GPP or other construction related to programmatic effort in the facility	400
Total related incremental annual funding requirement in FY 1984 dollars	$10,000

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding:

1. Total Facility

(a) Construction Line Item (no narrative required)

(b) PE&D - The SLC is a totally new kind of colliding beam system, and although the technology involved is well understood, the project benefits immeasurably from Plant Engineering and Design (PE&D) funding to more firmly establish component costs and conventional facility costs and schedules. The project was provided with $300,000 of PE&D funding in FY 1980, $750,000 in FY 1981, and $907,000 in FY 1982. The FY 1980 PE&D money funded a preliminary geological study of the site, preliminary tunnel and experimental hall design, and the study of alternative site layouts. The FY 1981 PE&D funding was allocated to more detailed site studies including test boring along the collider arcs, and to detailed structural design (Title I) of the linac/collider and connecting tunnels. In June 1981, SLAC retained the services of Tudor Engineering as an A/E firm to perform Title I and Title II design on the SLC project. The FY 1982 PE&D funding will support preliminary design of the experimental hall as well as partial detailed design of tunnels.

1. Title and location of project: Stanford Linear Accelerator Center (SLAC) Linear Collider (SLC)

2. Project No. 84-ER-133

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements - (continued):

(c) Expense Funded Equipment - none anticipated for this project.

(d) Inventories - no inventories are anticipated for this project.

2. Other Project Funding

(a) R&D Necessary to Complete - funds provided in High Energy Physics Research, Accelerator Research & Development (B&R code KA0301).

(b) Other Related Funding

Provide the capital equipment and plant funding needed in support of the R&D effort.

B. Total Related Funding Requirements:

The programmatically useful lifetime of the facility is estimated to be about 10 years.

1. Facility operating costs include the incremental costs of accelerator operations, experimental area operations, and related research and development efforts. These costs are for salaries, electric power, materials and supplies.

2. Programmatic Operating Expenses Directly Related to the Facility - this estimate is for high energy physics research to be performed by SLAC in-house physicists or physicists from the user community.

3. Capital Equipment Related to the Programmatic Effort in the Facility - this estimate is for general capital equipment needed to support research at the facility. It will provide for research detector apparatus, data recording and analysis instrumentation and miscellaneous laboratory instruments.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-131

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date Physical construction starts: 3rd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $9,000
Less amount for PE&D: 0
Net cost estimate: $9,000
Date: 5/81

7. **Financial Schedule:**

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$9,000	$9,000	$9,000	$5,500
1985	0	0	0	3,000
1986	0	0	0	500

8. **Brief Physical Description of Project:**

The following are examples of the major items of work to be performed at the various locations:

Brookhaven National Laboratory	$2,000,000

Funds are requested for modifications, improvements and additions to the Alternating Gradient Synchrotron (AGS) and its related experimental facilities. Items planned include: a high current H^- ion source to inject into a new radiofrequency quadrupole (RFQ) preaccelerating structure for the linac; an RFQ preaccelerator structure, which replaces the aging Cockroft-Walton, to provide greater reliability, higher efficiency and increased beam intensity; a higher order harmonic accelerating cavity for the AGS to provide longitudinal phase space control and reduce longitudinal beam instabilities; a new transition energy "jump" system to reduce beam loss at transition energy during high beam intensity operations.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-131

8. Brief Physical Description of Project - (continued):

Fermi National Accelerator Laboratory.. $5,100,000

Funds requested are for modifications, improvements and additions to the Fermilab accelerator facilities (which includes the linac accelerator, booster synchrotron, main ring, and newly commissioned energy saver ring) and to the beam lines, target faciliites and experimental areas.

Modifications to the accelerator facilities ($2,700,000) should include: improved central helium liquifier (CHL) compressor and refrigeration systems to increase helium throughput and CHL reliability; upgrading of Booster Synchrotron subsystems (vacuum, radiofrequency, etc.) to improve reliability and economy of operations; improved main ring and energy saver ring subsystems (injection, vacuum, magnetic correction elements, etc.) to facilitate operations in the energy saver modes; control system and instrumentation upgrading in various areas (main ring, energy saver, and external beam lines) to accommodate new operating modes; active and passive beam loss protection to further ensure that unexpected loss of the high energy beam will not damage accelerator components; and improvements to upgrade high intensity beam stability and oscillation damping in the main and energy saver rings.

Modifications to the experimental facilities ($2,400,000) should include: increase the helium refrigeration capacity and cryogenic distribution system in the neutrino experimental area to service additional superconducting magnets needed for approved experiments; construction of a counter house for the tagged photon laboratory to house equipment used for experiments in the photon beam line; Proton Center modifications and additions to provide additional equipment space and secondary beams for approved experiments; replacement of Low Conducting Water (LCW) system heat exchanges which are at the end of their useful life; replacement of tagged photon system target box to increase space for target components and shielding to reduce muon background radiation in downstream experiments; installation of a helium recovery system to recover boil-off helium from superconducting magnets.

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-131

8. Brief Physical Description of Project - (continued):

Stanford Linear Accelerator Center (SLAC) $1,900,000

Funds are requested for modifications, improvements and additions to the SLAC linear accelerator, to the SPEAR and PEP colliding beam facilities, and to the associated experimental facilities. Items now planned for FY 1984 include: instrumentation and control system improvements to provide increased monitoring and control of experimental beam lines in the Main Control Center; upgrade and renovation of the accelerator protection logic; upgrade of the accelerator beam current monitors to accommodate multiple, interlaced beam operation; modernization of linac radiofrequency (rf) drive and phasing system to improve rf phase stability and setability; electron gun and injector upgrade to provide longer pulse length and pulse amplitude control; upgrade of PEP injection line istrumentation and controls; modifications to vacuum chambers in PEP interaction regions to reduce background radiation to experiments; expansion of computer monitoring and control systems to mechanical and electrical support systems on SPEAR and PEP; modifications and additions to the SLED cavity temperature control system to provide temperature stability consistent with low emittance beam pulse operation; and integration of linac accelerator and personnel protection systems into the new computer control system.

9. Purpose, Justification of Need for, and Scope of Project

Accelerator improvements are essential to maintaining the short term operating efficiency, reliability, and research flexibility of the high energy accelerators, colliding beam systems and related experimental facilities, thereby maintaining their high level of scientific effectiveness and productivity. Research in high energy physics, being a highly competitive international effort, occurs at a rapid pace; further, each research facility is a unique assemblage of very specialized, high technology components. Consequently, there is a continuing need to modify facilities in response to research needs and to improve reliability, efficiency and economy of operation on a time scale shorter than the normal two-year budget cycle. The requested accelerator improvements and modifications will provide greater flexibility for experimental setups during operations. By capitalizing upon the ability to operate at increased performance level and by increasing serviceability and, thereby decreasing facility downtime, they will improve the productivity and scientific effectiveness of the U.S. program in High Energy Physics.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-131

9. Purpose, Justification of Need for, and Scope of Project - (continued):

Specifically, the project at Brookhaven National Laboratory will improve and extend the overall performance of the AGS by providing for higher brightness ion sources, more stable acceleration of higher intensity beams, increased beam control, and more sophisticated experimental area facilities.

At Fermi National Accelerator Laboratory, accelerator and experimental facility improvements will support better control and monitoring of a complex variety of high intensity particle beams, more economical use of electric power by upgrading and expanding the use of superconducting magnet systems and their requisite cryogenic support systems and more flexible operations of experimental areas by upgrading target structures, beam optics, and experimental enclosures and supporting service systems.

Finally, at Stanford Linear Accelerator Center, the facility performance, flexibility and linac energy will be upgraded through improvement of the control, instrumentation, radiofrequency acceleration, machine safety systems, and experimental area mechanical and electrical supporting systems.

10. Details of Cost Estimate

a. Engineering, design and inspection and component assembly and installation..................................	$9,000
Total Project Cost..	$9,000

11. Method of Performance

Design will be by contractor staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Basic Sciences
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-132

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3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $7,000
Less amount for PE&D: 0
Net cost estimate: $7,000
Date: 5/82

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7. Financial Schedule

		Costs			
Fiscal Year	Obligations	FY 1982	FY 1983	FY 1984	After FY 1984
Prior Year Projects	XXXXXXX	$ 1,781	$ 1,800	$ 0	$ 0
1982	$ 6,000	3,075	825	2,100	0
1983	6,500	0	1,700	2,600	2,200
1984	7,000	0	0	1,900	5,100

8. Brief physical description of project:

The following are examples of the major items of work to be performed at the various locations:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 84-ER-132

8. Brief physical description of project - (continued):

Brookhaven National Laboratory $3,200,000

Requirements include: Addition to the LINAC substation to provide power for neutral beam injection system for the AGS ($200,000); high energy equipment pool building, required for building, testing, calibrating and repairing highly specialized electronic instrumentation systems ($500,000); storage building for receiving and holding specialized accelerator magnet components ($200,000); building improvements for the Scientific Equipment Assembly building to improve overhead crane, air conditioning, heating and other building service and support systems ($350,000); building improve of biology laboratory to provide culture transfer rooms and related facilities for new cell and genetics research programs ($200,000); modifications to HVAC systems serving the medical research center, to conserve energy consumption ($200,000); building modifications to provide new waste study and corrosion labs for DOE Low Level Waste (LLW) management program ($350,000); cooling tower improvements for the cooling system of the High Flux Beam Reactor to ensure safe and reliable operation ($250,000); addition to the high bay area of the Heavy Machine Shop to provide a new centralized laboratory welding facility ($300,000); exhaust fume system improvements for the Medical Research Center to meet current safety and energy usage standards ($150,000); conversion of lecture hall to a training facility for personnel administration, safety, and affirmative action activities ($150,000); and miscellaneous smaller projects ($350,000).

Fermi National Accelerator Laboratory $2,500,000

Requirements include: Addition to Central Helium Liquifier (CHL) building to house equipment for an enhanced, site-wide helium recovery system ($300,000); improved primary power distribution system for the main ring to enhance reliability and safety of the main accelerator and Energy Saver rings at forecasted operating levels ($250,000); additional main ring service and support buildings to accommodate needed accelerator service support systems ($250,000); main ring access road and service building upgrade to repair deterioration due to age ($200,000); storage facility to store critical equipment and components necessary to accelerate operations in the immediate vicinity of the accelerator complex ($150,000); additional beam switchyard service building near G-2 area to house support and service equipment to operate external beam lines ($200,000); research services technical assembly building to provide heavy equipment, materials test, office, and laboratory space for the fabrication of large experimental apparatus ($650,000); extend industrial chilled water system to Meson West and Neutrino experimental areas to cool equipment in experimental areas and provide additional water for fire protection ($300,000); and site improvements in all three experimental areas to solve drainage and other problems in response to changing needs and conditions of the experimental program ($200,000).

1. Title and location of project: General plant projects, various locations 2. Project No. 84-ER-132

8. Brief physical description of project - (continued):

Stanford Linear Accelerator Center $1,300,000

Requirements include: expansion of master control center to accommodate additional accelerator control and safety equipment and to provide housing for technical and administrative support services now housed in temporary trailers ($700,000); installation of cooling tower to handle accelerator energy increases and SLC-related test equipment ($320,000); modifications to PEP Region 4 and Region 12 support buildings to provide additional office and laboratory space for scientists working on physics experiments ($280,000).

9. Purpose, justification of need for, and scope of project:

General plant projects are required for the general maintenance, modification and improvement of the overall laboratory plant and include minor new construction, capital alterations and additions, and improvements to buildings and utility systems. These are short-term projects whose timely accomplishment is essential for maintaining the productivity, increasing the operational cost effectiveness, and ensuring that necessary support services are available to the research program at the DOE-owned facilities. Since it is difficult to detail the most urgently needed items in advance, a continuing evaluation of requirements and priorities may result in additions, deletions, and changes to the currently planned subprojects. In general, the estimated funding for each location is preliminary in nature, and is intended primarily to indicate the relative magnitude of the requirements. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under consideration.

The funds requested for FY 1984 are estimated as follows:

Brookhaven National Laboratory	$3,200
Fermi National Accelerator Laboratory	2,500
Stanford Linear Accelerator Center	1,300
Total Project Cost	$7,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Nuclear Physics
General Science and Research - Operating Expenses
General Science and Research - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Nuclear Physics (NP)				
Medium Energy Nuclear Physics				
Operating Expenses	$ 50,600[a]	$ 52,258	$ 52,258	$ 59,000
Subtotal	50,600	52,258	52,258	59,000
Heavy Ion Nuclear Physics				
Operating Expenses	41,814[b]	39,700	39,700	47,000
Subtotal	41,814	39,700	39,700	47,000
Low Energy Nuclear Physics				
Operating Expenses	12,257[c]	12,257[c]	12,257	13,000
Subtotal	12,257	12,257	12,257	13,000
Nuclear Theory				
Operating Expenses	7,700	8,150	8,150	9,000
Subtotal	7,700	8,150	8,150	9,000
Capital Equipment	9,510[d]	10,444[d]	10,444	11,300
Construction	12,000	7,700	7,700	13,700
Total				
Operating Expenses	112,371	112,365	112,365	128,000
Capital Equipment	9,510	10,444	10,444	11,300
Construction.................	12,000	7,700	7,700	13,700
Nuclear Physics	$133,881	$130,509	$130,509	$153,000

Staffing FTP/Total FTE's: (Reference General Science Program Direction Decision Unit).

Authorization: Section 209, P.L. 95-91

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[a] Does not include $2,000,000 in FY 1982 which was budgeted under Defense Programs for LAMPF facility operations

[b] Includes $2,714,000 in FY 1982 which was budgeted under Life Sciences Research and Nuclear Medicine Applications for Bevalac facility operations. Also includes $1,000,000 which was deferred from FY 1981 to FY 1982.

[c] Budgeted under Nuclear Sciences subprogram of Basic Energy Sciences in FY 1982 and FY 1983.

[d] Includes $510,000 in FY 1982 and $510,000 in FY 1983 which was budgeted under Nuclear Sciences subprogram of Basic Energy Sciences.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
General Science and Research
(dollars in thousands)

FY 1983 Appropriation Enacted	$130,509
Built-in increases and decreases	0
FY 1984 Base	$130,509
Program increases and decreases:	
Nuclear Physics	
o Maintain scientific research and accelerator facility operations at FY 1983 levels of activity	+ 7,135
o Establish, by means of an Accelerator Improvement project, a new Stanford Linear Accelerator Center (SLAC) injector for a high energy, very low duty factor program of nuclear physics	+ 1,650
o Increase levels of scientific research and accelerator facility operations to those levels experienced in FY 1982 (for example, in going from FY 1982 to FY 1983, Los Alamos Meson Physics Facility (LAMPF) and Argonne National Laboratory (ANL) Tandem/Linac utilization each decrease by 20%)	+ 8,500
o Complete funding of Argonne Tandem/Linac Accelerator System (ATLAS) construction project in FY 1983	- 3,700
o Maintain the scientific productivity of on-campus accelerator facilities at Yale University and University of Washington by upgrade of accelerator performance capabilities	+ 8,000
o Provide instrumentation and minor construction necessary to meet needs of research program	+ 906
FY 1984 Budget Request	$153,000

Overview

Nuclear Physics is a comprehensive program of interdependent experimental and theoretical investigations of atomic nuclei. Basic ingredients of the program are talented and imaginative scientists and a diversity of facilities to provide the variety of probes, instruments, and computational equipment needed for modern nuclear research. Over 80% of the total Federal support of basic nuclear research is provided through the Nuclear Physics program; almost all of the remaining 20% is provided by the National Science Foundation. The Department functions as the Federal executive agent for this area of basic science.

The long range goals of the Nuclear Physics program are an understanding of the interactions, properties, and structures of atomic nuclei and nuclear matter at an elementary level and an understanding of the fundamental forces of nature by using nuclei as a proving ground. Because nuclear interactions and the behavior of nuclei and nuclear matter determine the physical properties of our universe, quantitative knowledge of nuclei is essential to any basic understanding of the world about us.

Nuclear knowledge, techniques, instruments, and applications pervade modern American society. These serve as the basis for our national defense strategy, for therapeutic and diagnostic medical applications, for generation of electricity with nuclear reactors to serve our economy (fission now and fusion in the future), and for a large and diverse array of applications in industry. This Nuclear Physics program is a central component in America's long term investment in its technological future with nuclear processes.

Long Range Planning

Long range planning, scientific community input, and coordination of work by this agency with National Science Foundation (NSF) activities take place through a variety of channels. The most important of these channels are external and internal review of specific research areas, frequent staff contact with counterparts at NSF, and the work of the DOE/NSF Nuclear Science Advisory Committee (NSAC). In cooperation with this agency and NSF, NSAC developed a long range plan for basic nuclear research in the United States -- "A Long Range Plan for Nuclear Science" (December 1979). The Nuclear Physics budget request for FY 1984 is formulated within the scientific guidelines set forth by the NSAC Long Range Plan.

FY 1984 Highlights

From its inception at the beginning of this century, nuclear research has been and remains predominantly an experimental science, but a science firmly committed to development of quantitative and predictive theory. New knowledge is gained by performing experiments and by interpreting results of experiments in terms of fundamental theory. A vigorous nuclear theory effort must be present to formulate the fundamental theories, to interpret the results of experiments, and to guide planning for new experiments. In FY 1984, the level of effort in nuclear theory will be increased to meet overall Nuclear Physics program requirements.

Work by university-based nuclear scientists is a prominent component of the Nuclear Physics program. University scientists conduct experiments at the national accelerator facilities and at dedicated on-campus accelerator facilities. In order to maintain the scientific strength and attractiveness of university-based facilities to students, these facilities must be maintained at scientifically competitive levels. In the FY 1984 request for construction funds, $8,000,000 (Total Estimated Cost = $19,000,000; $8,000,000 in FY 1984 and $11,000,000 in FY 1985) is planned for upgrade of on-campus accelerator facilities at Yale University (New Haven, Connecticut) and the University of Washington (Seattle, Washington). The upgraded facilities will allow continuation of the excellent records of scientific productivity and academic preeminence of these outstanding institutions. In its evaluation of FY 1984 needs for facility upgrade/construction for basic nuclear research, NSAC strongly endorsed upgrade of the Yale and Washington accelerator facilities and found the specific projects to be "scientifically valuable and technically feasible."

The underlying quark structure of protons and neutrons must play an important role in the makeup of nuclei. However, understanding and quantifying this role remains an important task. High priority experiments in FY 1984 are planned with LAMPF's (Clinton P. Anderson Meson Physics Facility at Los Alamos National Laboratory) intense pi meson beams and with Bevalac's (Lawrence Berkeley Laboratory) new high energy uranium beam capability. Another important thrust in this quark substructure effort is the high energy electron scattering experimental program at the Stanford Linear Accelerator Center (SLAC). The injector project (Total Estimated Cost = $1,650,000; all in FY 1984), discussed under Accelerator Improvement Projects, is needed for efficient conduct of these experiments as well as conduct of research to understand the magnetic structure of nuclei. NSAC has assigned a high scientific priority to this project and has concluded that proposed experiments with the new SLAC injector will form a bridge from present electron scattering experiments to the very important high duty factor research which is highlighted in the Long Range Plan.

Experiments which examine the weak interaction and properties of the neutrino will also be a major thrust of the FY 1984 Nuclear Physics program. The weak interaction governs beta decay of nuclei and is one of the three fundamental forces which determine the characteristics of nuclei. In FY 1984, highlights of this area of emphasis include research with polarized electron beams at the William H. Bates Electron Accelerator Laboratory (Massachusetts Institute of Technology) and with LAMPF's uniquely pure and intense muon and neutrino beams.

In FY 1984, emphasis will be given to heavy ion research with ions more massive than calcium and in the projectile energy range of 10 MeV (million electron volts) per nucleon and above. In particular, the newly available beams at the Holifield Heavy Ion Research Facility (Oak Ridge National Laboratory), the Bevalac low energy beam line, and the Argonne tandem/linac (Argonne National Laboratory) will be used to study the mechanisms by which colliding nuclei exchange mass, energy, and angular momentum. Above 30 MeV per nucleon, the projectiles are moving at speeds which exceed the average internal velocity of neutrons and protons inside the stationary target nuclei and which exceed the velocity of sound in nuclear matter. Collisions of target nuclei with projectile nuclei at these energies cause formation of intense concentrations of energy and mass. From these experiments, we expect to learn how nuclear matter acts as it is compressed and how energy moves through nuclear matter.

Accelerator Facilities

Success of the Nuclear Physics program depends upon the existence and effective operation of large and complex accelerator facilities. These facilities provide the variety of projectile beams which are required for forefront nuclear research. In FY 1984, our highest priorities will be upgrade of these facilities to meet evolving research requirements and operation of these facilities a sufficient number of hours in FY 1984 to meet the needs of the research program. Seven accelerator facilities are operated as national facilities whose beam time is made available to all the Nation's scientists on the basis of scientific merit and technical feasibility. The national facilities are: the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory (LANL); the William H. Bates Linear Accelerator Facility at Massachusetts Institute of Technology; the SuperHILAC/Bevalac at Lawrence Berkeley Laboratory (LBL); the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory (ORNL); the 88-inch Cyclotron at Lawrence Berkeley Laboratory; the Tandem/Linac Facility at Argonne National Laboratory; and the Double MP Tandem Van de Graaff facility at Brookhaven National Laboratory (BNL). In addition, the TRISTAN On-Line Isotope Separator at Brookhaven National Laboratory's High Flux Beam Reactor functions as a national facility.

Each of the national facilities accommodates major university-based user group research programs. Typically, an outside user group plans experiments at the home institution, executes and partially analyzes experiments at the national facility, and completes analyses and publication of results at the home institution. Nuclear Physics directly supports 75 university-based user groups who conduct most or all of their research at these national facilities. To complement the national facilities, the Nuclear Physics program supports dedicated on-campus accelerators at Yale University, Duke University, University of Washington, and Texas A&M University.

In FY 1984, $66,300,000 of Operating Expenses funds is needed for operation of the national and dedicated accelerator facilities in order for them to achieve levels of utilization experienced in FY 1982. Of this total for facility operations, $12,000,000 is budgeted for electric power costs. Electric power rates at the two largest Nuclear Physics facilities, LAMPF and SuperHILAC/Bevalac, continue to increase at approximately 16% per year. Within the FY 1984 Operating Expenses request, $52,700,000 is planned for experimental research and $9,000,000 for theoretical research. Of the FY 1984 Operating Expenses request, 25% is planned as direct support for university-based users at American and international facilities, operation of on-campus accelerator facilities, research at on-campus facilities, and research by university theorists.

	FY 1982	FY 1983	FY 1984 Request
Medium Energy Nuclear Physics	$ 50,600	$ 52,258	$ 59,000

Medium Energy Nuclear Physics is concerned with experimental research at accelerator facilities with sufficient primary beam energy to produce pi mesons (pions) using projectiles no more massive than alpha particles. This subprogram also supports a class of experiments at accelerators operated by the High Energy Physics program and/or unique foreign facilities in which the primary scientific motivation is the study of nuclear structure, reaction mechanisms, or fundamental interactions of nuclei.

The Medium Energy subprogram supports the operation of two national accelerator facilities--the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory and the William H. Bates Electron Accelerator Laboratory operated by the Massachusetts Institute of Technology. These accelerator facilities serve a nationwide community of scientists from over 100 American institutions, of which over 90% are universities. Nearly all of the "outside user" groups receive direct project support for their research activities from either this agency or the National Science Foundation.

In FY 1984, $59,000,000 in operating funds is requested for the Medium Energy Nuclear Physics subprogram. This is $8,400,000 above the amount appropriated for Medium Energy in FY 1982 and continues the FY 1982 level of effort. More than 60% of this FY 1984 request ($36,100,000) is required for the costs of operations at the LAMPF and Bates facilities. In addition to supporting the operation of the accelerators themselves, these operations costs also provide for the maintenance and operation of secondary beam lines, major spectrometer systems, and other permanently installed experimental equipment. The remaining nearly 40% of the budget supports costs directly attributable to executing individual experiments, support of participating research scientists, and advanced accelerator physics studies. Of the $59,000,000 request in FY 1984, $15,750,000 will be in direct support of universities. Additional university support is provided through LAMPF in the form of services in support of experiments and provision of beam time.

LAMPF is by far the larger of the two accelerator facilities supported under the Medium Energy subprogram. The facility is centered around a linear accelerator which is capable of accelerating very intense beams of protons to 800 MeV. The ability to provide ten or more simultaneously operating beams of protons, neutrons, pions, muons, or neutrinos enables LAMPF to be a highly cost-effective basic nuclear research facility. In addition to providing beams for nuclear research, LAMPF provides beams for basic materials research and weapons development at the Weapons Neutron Research (WNR) facility.

Areas of basic nuclear research at LAMPF cover a broad spectrum. Some of the more active areas include studies of:

1. The nucleon-nucleon interaction. Since the nucleon-nucleon (nucleon is the generic name for neutrons and protons) interaction is the key ingredient in microscopic descriptions of nucleon-nucleus and nucleus-nucleus reactions, studies of elastic and inelastic scattering of nucleons continue to be a major focus of attention in the LAMPF program.

2. Proton-nucleus interactions. There is great interest among nuclear theorists in the nucleon-nucleus effective interaction, its energy dependence from 100 to 800 MeV, and the changing interplay of its various components. The recent introduction of variable energy, polarized proton beam capability to the High Resolution Spectrometer (HRS) system provides the opportunity to study these interactions in the most penetrating ways.

3. Pion-nucleus interactions. Systematic studies of such phenomena as giant resonances and pion absorption, and their interpretations in terms of various theoretical models, are critical to achieving a satisfactory unified description of nuclear phenomena. LAMPF's experimental facilities, based on the Energetic Pion Channel and Spectrometer (EPICS), are the best of their kind anywhere. Experiments using EPICS have yielded many interesting results and exert a dominating influence over the development of this part of the field. According to the best of existing theories, a pion is a quark and antiquark bound together; whereas, protons and neutrons are combinations of three quarks bound together. We expect to gain important information on how quarks behave inside nuclei by observation of the ways in which pions: (1) scatter from the neutrons and protons which makeup nuclei; (2) are absorbed by these neutrons and protons; and (3) combine with protons and neutrons to form a new three quark configuration called a delta resonance.

4. The fundamental weak interaction. Neutrinos are particularly intriguing subnuclear particles which have no electrical charge and little, if any, mass but which are essential to our understanding of the weak force of nature and possible unification of the various fundamental forces. The continuing high interest in the possibility of neutrino "oscillations" and in neutrino-electron scattering and other neutrino physics has stimulated substantial activity at LAMPF using the proton beam dump as a neutrino source. LAMPF's intense muon beams are also being used to probe the weak interaction with ten to one thousand times more sensitivity than previous measurements.

LAMPF possesses strength and balance across much of nuclear science. Research teams from the large community of LAMPF users are now studying areas of science even beyond the wide range of those identified as being of interest when the facility was being planned. For example, the first experimental evidence for the so-called "isovector monopole" excitation of a nucleus was obtained by means of LAMPF investigations of the reactions of pions with nuclei. Isovector monopole excitations are one member of a class of nuclear states called "collective" states. When a collective nuclear state is excited, the protons and neutrons inside the nucleus move in unison, that is, move collectively. Because of particular selective features of pion interactions, pion-nucleus reactions of the kind described above excite only isovector modes of the nucleus. Thus, this reaction can be used to establish the systematics of the isovector monopole mode and to investigate the existence and structure of other collective isovector excitations. This line of research will continue in FY 1984.

Some of LAMPF's current research programs are within striking distance of meeting their original scientific objectives--for example, the study of the proton-proton interaction at intermediate energies: an excellent database, which is needed for development and evaluation of microscopic theories of nuclear structure, has been established. On the other hand, extensions of this study to include the neutron-proton interaction to comparable precision, pion production, and various symmetries of the nucleon-nucleon force are just beginning. Experiments on the rare decays of muons and on neutrino interactions are also in the early stages of development. LAMPF's unique capabilities give users the possibility to shed light on some of the key questions posed by gauge theories of the electroweak interactions. A gradual shift in the balance of the LAMPF program towards such basic questions seems inevitable.

To operate LAMPF in FY 1984, $30,800,000 is required, an increase of $6,528,000 over FY 1982. (No Defense Programs support for LAMPF operations is projected for FY 1984.) In FY 1984, LAMPF will provide 3000 beam hours for experiments--approximately the same as FY 1982 beam hours. In addition, $12,000,000 is required for the conduct of research at LAMPF by Los Alamos scientists and by outside user groups, including university groups.

The other accelerator facility supported under the Medium Energy subprogram is the Bates accelerator facility. With the recent successful completion of the Bates Recirculator project (80-GS-2), the accelerator is capable of producing electron beams of excellent quality at energies up to 750 MeV. Since 1974, with the first results of the Bates experimental program, a major part of the program has been high resolution nuclear structure studies with electrons. Since its beginning, Bates has been the premier facility in the world for nuclear structure studies involving high resolution electron scattering. Achromatic transport of the beam to the spectrometer focal plane allows energy-loss spectroscopy to be done using the full beam current of the accelerator and with energy resolution of about one part in ten thousand.

Some of the highlights of the Bates nuclear structure program include studies of:

1. Rotational nuclei. In the field of electron-nucleus inelastic scattering, scientists working at Bates have performed definitive experiments in the area of deformed nuclei and have made a systematic study of both charge and magnetic form factors. Theoretical interpretation of these results has provided nuclear science with a microscopic understanding of collective nuclear rotation and its coupling to single particle degrees of freedom.

2. High spin states. High lying states of high spin were observed at Bates for the first time using electron scattering at large momentum transfer. These excitations are among the simplest ones the nucleus exhibits. They provide discriminating tests of our theoretical understanding of nuclear wave functions.

3. Magnetic scattering. Using the 180° scattering system, Bates users have provided the first reasonably systematic set of elastic and inelastic form factors. For selected cases, the high sensitivity of magnetic form factors to meson exchange currents appears to provide the cleanest tool for the study of mesonic degrees of freedom in nuclei.

In addition to the Recirculator project, which has achieved a near doubling of the primary beam energy, Bates has brought into operation of a set of spectrometers--in a second experimental area--which dramatically broaden the scope of the Bates research program. A polarized electron source will be installed in FY 1983 and will provide yet another valuable dimension to the Bates capability. Since the energy loss spectrometer, which has been the mainstay of the Bates program, is capable of operating at energies up to 900 MeV (above the new capability of the accelerator), high resolution electron scattering will continue to be an important part of the Bates program.

To operate Bates in FY 1984, $5,300,000 is required, an increase of $697,000 over FY 1982. In addition, $2,600,000 is required for the conduct of research at Bates by MIT scientists and outside user groups.

Accelerator physics research continues at Los Alamos National Laboratory and the National Bureau of Standards. The objectives of this research are the detailed examination of accelerator performance criteria for applications in basic and applied research and the establishment of feasibility of new design concepts for a high-duty-factor electron accelerator in the few billion electron volt energy range. An important result of this research program is the finding that a type of accelerating cavity structure that at first appeared promising cannot be used because of fundamental limitations inherent to the type of structure. Completion of these studies is planned for FY 1985.

Kaon nuclear studies at the Brookhaven Alternating Gradient Synchrotron (AGS) will continue in FY 1984 as an important component of the Medium Energy subprogram. The unique capabilities of the BNL hypernuclear spectrometer have been exploited in an extensive study of the p-shell hypernuclei produced in reactions with incident negatively charged kaons and outgoing negatively charged pions. Within the 2.5 MeV resolution available in this experiment, a rich spectrum of levels in hypernuclei was observed. Results of the analysis of these data bear out the suggestion that the lambda spin-orbit coupling is near zero and challenge current theoretical understanding of the origin of the nuclear spin-orbit force. The High Energy Physics program supports costs of AGS accelerator facility operations. In FY 1984, Nuclear Physics support of AGS-based research, including university user groups, is budgeted at $1,700,000 (an increase of $300,000 over FY 1982).

	FY 1982	FY 1983	FY 1984 Request
Heavy Ion Nuclear Physics................	$ 41,814	$ 39,700	$ 47,000

The Heavy Ion Nuclear Physics subprogram provides facilities to accelerate massive nuclei for bombardment of other massive nuclei. It also provides equipment and scientific personnel for the detection, analysis, and understanding of the resulting nuclear reactions. A heavy ion is defined as any ion whose nucleus is more massive than the alpha particle--the most common type of nucleus in helium atoms. The alpha particle has a mass of 4 atomic mass units (AMU). The energies of the accelerated projectiles range from about 1 MeV/AMU (million electron volts per atomic mass unit) to 2100 MeV/AMU. At the lowest energies and with the lightest masses, Heavy Ion research joins smoothly with that of Low Energy Nuclear Physics. At the highest energies, many of the goals and techniques are closely akin to those of Medium Energy Nuclear Physics and High Energy Physics. The distinguishing characteristic of the field is the ability of heavy ion induced reactions to transfer large amounts of energy, linear and angular momentum, and matter between the colliding partners. With newly developed and developing apparatus and techniques, these reactions can be performed with sensitive variations of energy, projectile and target species, and detector capabilities.

The Heavy Ion subprogram supports facilities at four national laboratories and three universities. Each of the national laboratory-based accelerators is operated as a national facility. Access to machine time and experimental equipment is open to all qualified American scientists on the basis of proposals reviewed for scientific merit and technical feasibility.

At Brookhaven National Laboratory, the double MP tandem facility is characterized by a wide selection of precise continuous beams at low energies. The ANL tandem/linac is able to provide heavier projectiles at higher energies, with beams that can be controlled very precisely in energy or with sharply pulsed structure for timing experiments. Upon completion in FY 1985, the ATLAS construction project (82-E-223, initiated in FY 1982) will significantly extend ANL capabilities to higher mass and higher energy. The Holifield Heavy Ion Research Facility is a just-completed, state-of-the-art tandem accelerator designed to achieve 25 MV on the terminal and is well-equipped with many new detection devices. Used alone or coupled with the ORIC cyclotron, it will provide the highest energy precision beams and widest variety of projectiles. The LBL SuperHILAC, at present, is the only United States machine that can provide beams with masses greater than 80 AMU with very high intensity and acceptable energy resolution. The LBL 88-inch Cyclotron presently supplies the highest energy precision beams of the lighter heavy ions (up to 40 AMU). Because it accelerates positive ions, it provides a selection of heavy ion species which is complementary to that of the tandem facilities. The LBL Bevalac is unique in the world, providing beams from helium to uranium at energies up to 2100 MeV/AMU. The beam quality and intensity, however, do not rival those of the lower energy machines. The university laboratories at Yale University, University of Washington, and Texas A&M University all have specialized accelerator and detector capabilities.

Work in FY 1984 will emphasize implementation and utilization of new and unique research capabilities. Holifield will have completed start-up activities and begun full-time operation in early FY 1983. In addition, its experimental facilities, computer systems, spin spectrometer, recoil mass spectrometer, and the University Isotope Separator at Oak Ridge (UNISOR) laser facility will be completely functional. At the Bevalac, full utilization will be made of the uranium beam capability (which first became available in FY 1982), the Heavy Ion Spectrometer System (HISS) spectrometer, and the plastic ball and wall detector.

The physics addressed by heavy ion nuclear research spans a wide range of interests. However, the problems can be divided into three major areas, each characterized by the degree of equilibration that dominates the reaction mechanism. This important criterion is a measure of the amount of mixing that takes place between the nucleon constituents of the colliding partners and is directly correlated with the period of time necessary for the reaction to take place. Highlights of each of the areas are given:

1. Barrier physics. At the lowest energies of a few MeV/AMU, colliding heavy ions have just enough energy to exceed the repulsive electrostatic force between them. This electric force forms a barrier which must be surpassed to allow the attractive nuclear force to fuse the two heavy ions into a nuclear complex. Having fused, however, the nuclear constituents have a relatively long time to equilibrate. The investigation of the fusion process has been greatly advanced by the recent availability of precise beams with finely variable energies and improved selection of specific projectile-target pairs. The number and angular momentum of protons and neutrons at the surfaces of colliding nuclei have been found to modify strongly the likelihood of fusion. The understanding and exploitation of this effect may lead to the first potentially fruitful approach to the creation of super-heavy elements. New recoil mass spectrometers at Holifield and the SuperHILAC are crucial for proper performance of these experiments.

   The fusion of heavy ions is the only general method of creating new neutron-deficient nuclei far from stability. These new nuclei decay with lifetimes of fractions of seconds to a few seconds, requiring sophisticated apparatus in order to measure their properties. The UNISOR facility at Holifield and the Recoil Atom Mass Analyzer (RAMA) installation at the LBL 88-inch Cyclotron are major detection systems which separate by magnetic deflection the desired products from the high radiation background in the production area. (The UNISOR facility is jointly supported by the Department of Energy and 12 member universities.) Nuclear mass and lifetime measurements with these devices are being used to explore a new region of stability, including a new area of proton radioactivity. The spectroscopy of heavy nuclei is yielding important information on the interaction of nucleons with deformed nuclear surfaces. These results are especially timely to test predictions of the developing interacting Boson-Fermion approximation (IBFA) model of nuclear structure. New, laser-based facilities at Holifield and ANL will measure nuclear radii, spins, and dipole moments of short-lived nuclear ground states and isomeric states.

2. Transition region reactions. At somewhat higher energies of a few tens of MeV/AMU, new reaction mechanisms arise which do not permit the colliding nuclei to reach complete equilibrium. In the deep inelastic scattering process, two heavy ions in grazing trajectories come in sufficient contact to revolve briefly around each other before they fly apart. During the time of contact, mass, charge, and energy flow from one nucleus to the other, depending sensitively on the total energy and projectile-target species. Comparison of results from SuperHILAC experiments with theories of dissipation strongly suggest that the observed partial equilibration is due to rapid exchange of protons and neutrons between the two colliding nuclei. The apparent noninvolvement of collective effects, such as surface vibrations or deformations, is surprising and still controversial. A striking extension of this process is in the $^{12}C + ^{12}C$ system studied at Yale and BNL. Strong regular resonances seen in the scattering of this light symmetric system are tentatively explained by the prolonged orbiting of the two nuclei, leading to a "quasi-molecular" dumbbell-shaped system.

   A second process has recently been identified in which the colliding nuclei escape from complete fusion. In this process, a large portion of the projectile fuses with the target, but many nucleons or other projectile fragments continue forward with minimum deflection. This incomplete fusion process is not yet understood but may indicate the existence of an intrinsic limit of nuclei to absorb angular momentum. Results from ORNL seem to confirm this limit, while ANL and LBL results disagree. Theoretical insight is provided by computer intensive TDHF (time-dependent Hartree-Fock) calculations. Work to resolve this scientific puzzle will be vigorously pursued both experimentally and theoretically in FY 1984.

   Independent of the mechanism, injection of large amounts of angular momentum by heavy ion collisions provides a unique opportunity to test the response of nuclei to the stresses of high spins. In prolate (football shaped) deformed nuclei, it was expected that sequential addition of angular momentum would cause the nucleus to spin faster and stretch even further until it finally fissioned. Surprisingly, the nucleus accommodated in a radically different way. After a moderate amount of angular momentum was added, a pair of anti-aligned, high-spin nucleons would decouple and realign with their spins parallel. Simultaneously, the core would slow down. Further additions of angular momentum would decouple more nucleon pairs until the spin was all absorbed in streams of nucleons flowing around the stationary nuclear waist. The nucleus gradually becomes oblate (tangerine shaped). Detailed investigation of this unusual phenomenon will be continued in FY 1984 with the new spin spectrometer at Holifield, the crystal ball detector at LBL, and the superconducting conversion electron spectrometer at ANL.

3. Relativistic reactions. As the energies of the heavy ion beams are further increased past 30 to 100 MeV/AMU, the velocity of the projectiles exceeds the speed of sound in nuclear matter and the average internal velocity of nucleons in the surface of the target nucleus. The nucleus no longer has time to accommodate to the stress of a collision in a graceful way. In some cases of grazing collisions, the projectile is quickly shattered, but its remnants are not greatly altered in speed or direction. Detectors down-stream view these projectile fragments as a snapshot of the initial cluster composition and internal motion of nucleons and clusters of nucleons inside the projectile. Concurrently, the projectile's passing abrades a small wound on the side of the target nucleus. The size of this "hot spot" and its equilibration into the nucleus is being measured by observation of the correlations between pairs of pions or protons emitted from it. This technique was first developed by Hanbury-Brown and Twiss for optically measuring stellar sizes. First results from these experiments yield hot spot sizes which are about one half the size of the nucleus but which readily thermalize into the bulk of the nucleus. The only United States facility presently available for doing these experiments is the LBL Bevalac. Above 200 MeV/AMU, the Bevalac will remain the world's unique facility for the foreseeable future and will support an important research effort at these energies in FY 1984.

At the Bevalac, relativistic heavy ions undergoing central or "head-on" collisions are even more spectacular. Streamer chamber photographs dramatically illustrate events in which more than 100 charged particle tracks emerge from the explosive interaction. The two original pieces of nuclear matter congeal briefly into a very hot plasma of nucleons and freshly created mesons. Jets of mesons and electron-positron correlations will be used to measure features of this plasma before it has time to expand and cool. To be tested are conjectures of the existence of pion condensates and states of nuclear matter at densities of several times normal. Because these experiments are expected to yield unique information on the properties and behavior of nuclear matter, they will be a central component of the overall Bevalac effort in FY 1984.

At the highest Bevalac energies and beyond, theories predict that heavy ion central collisions will create a quark and gluon plasma, which rapidly expands and decays into observable mesons and nucleons. The pressures and temperatures of the nuclear matter for these brief instants simulate the nature of the universe during a fraction of a second after creation. One of the products of these exotic reactions is called the "anomalon"; we have good evidence that anomalons have been observed at the Bevalac. This transitory object has most of the attributes of normal nuclear matter but is ten times more reactive. Theorists are examining the suggestion that the anomalon contains pieces in which the normal triplet quark structure of two adjacent nucleons is rearranged into three doublet structures. Another explanation being evaluated is the possible formation of free, stable two-quark objects. In fact, a broad variety of intense theoretical effort is being expended to specify the signatures of exotic reactions. This will guide experiments in FY 1984 and beyond in distinguishing desired events from more prolific background processes. These experiments have been aided by the successful completion of the LBL Uranium Beams upgrade project in FY 1982, which will allow the concentration of more than 100,000 MeV into the volume of a nucleus. The massive number of outgoing fragments requires the use of the superconducting HISS spectrometer, the 815-element plastic ball detector, and new image intensifier instrumentation on the streamer chamber.

While the central objective of the Heavy Ion subprogram is basic nuclear research, heavy ion accelerators have important applications in atomic physics research, astrophysics, fusion energy technology, biomedical research, and human cancer therapy. Bevalac heavy ion beams are used to evaluate the effectiveness of heavy ions in destroying human cancer cells while doing minimum damage to intervening healthy cells. This research is supported and managed by the National Cancer Institute and this agency's Life Sciences Research and Nuclear Medicine Applications program. All facility operations costs of Bevalac, including those for biomedical research, are supported by the Heavy Ion Nuclear Physics subprogram. Heavy ion accelerator facilities are also unique sources of atomic ions found only in interstellar space and in the very hot plasma of a working fusion reactor. Atomic data from heavy ion accelerator facilities will be increasingly important for diagnosis of fusion reactor operation as those reactors reach the working prototype stage.

In FY 1984, $47,000,000 is requested for Heavy Ion Nuclear Physics. This is $5,186,000 more than in FY 1982, a 12% increase for those two years. Operation of the national facilities and three university laboratories requires $27,200,000 of that amount. In order to exploit its unique scientific capabilities, Bevalac beam time for experiments will be increased from 1800 hours in FY 1982 to 3000 hours in FY 1984. The Brookhaven double MP Tandem and Lawrence Berkeley Laboratory SuperHILAC will continue operations at reduced levels established in FY 1983. However, utilization of the ANL tandem/linac in FY 1984 will be increased to meet research need for its beams.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 84-ER-132

10. **Details of cost estimate:**

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs include engineering, design and inspection.

11. **Method of performance:**

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts on the basis of competitive bidding.

The remaining $19,800,000 supports the heavy ion research program, the major fraction of which is based at facilities supported by this subprogram. A small fraction of the research is performed at NSF-supported accelerators and at unique foreign facilities. Of the research funds, $5,200,000 will go directly to university-based research programs. Additional university support is provided through the national laboratories in the form of services in support of experiments and provision of beam time. The remainder of the research funding supports the activities of the in-house research groups at the national laboratories.

	FY 1982	FY 1982	FY 1984 Request
Low Energy Nuclear Physics	$ 12,257	$ 12,257	$ 13,000

Low energy nuclear physics is concerned with experimental research involving light ions, neutrons, and gamma rays at energies insufficient to produce pi mesons. These projectiles are indispensable for the study of nuclear structure and reaction mechanisms. Research includes determination of nuclear potentials, for example, the nucleon-nucleus optical potentials. Medium energy electron scattering data and muonic x-ray data have been combined with high-precision proton and neutron scattering data at low energy to provide a new level of understanding of the nuclear optical model.

Low energy nuclear physics experimentation is continually being improved by the development of new techniques and instrumentation. This is exemplified in the recent advances made in the capability for producing polarized beams suitable for acceleration by tandem Van de Graaffs, as well as in the fabrication of improved targets of polarized nuclei. Recent measurements of polarization in nucleon-transfer reactions have yielded results completely at variance with theoretical predictions. New, advanced design, polarized ion sources are being installed at Duke University and University of Washington so that these accelerator laboratories may conduct the next generation of polarization experiments.

At the University of Washington, most of the light-ion research is performed at the double FN tandem accelerator which is located on campus. The new high-intensity, polarized ion source will greatly enlarge the number of nuclear systems accessible to continuing studies of parity mixing in light nuclei. These studies are particularly timely because of a very surprising result reported from the USSR based on the neutron-proton capture reaction. A new magnetic momentum filter/spectrograph, being brought into operation at the University of Washington, will be used in FY 1984 together with a specially designed polarimeter to perform definitive measurements of the polarizations of the protons produced in nuclear reactions.

Light-ion and neutron research is performed at the Triangle Universities Nuclear Laboratory (TUNL) Cyclograaff accelerator. TUNL is located on the Duke University campus and is a consortium of Duke University, University of North Carolina, and North Carolina State University. A recent upgrade has made polarized beams available from the tandem of intensity sufficient to permit new measurements using polarized neutrons (obtained from polarized deuteron beams). Polarized neutrons are particularly useful for the study of low energy reactions, since they avoid the otherwise strong repulsive electrostatic effects that one encounters with electrically charged projectiles. Nearing completion is a cryogenic polarized target facility that will permit the study of the reactions of polarized neutrons on polarized nuclei and, thus, open a new area of research to be pursued vigorously in FY 1984.

The proton beam from the Yale University tandem accelerator is being used to search for physical evidence for supersymmetries in nature. This experimental work has been inspired by a new approach to nuclear structure being developed by members of the Yale nuclear theory group.

Research exploiting the unique High Flux Beam Reactor facility at BNL currently emphasizes two research areas: (1) the study of neutron-rich fission-fragment nuclei at the on-line isotope separator TRISTAN and (2) the study of complete systems of low-lying, low-spin states of nuclei by means of the technique of average resonance capture gamma rays. The TRISTAN studies include measurements of beta-delayed neutron emission (of interest to both basic nuclear physics and fission reactor designers), beta decay end-point energies to determine nuclear masses precisely for nuclei far from stability, and gamma ray spectra and angular correlations to determine energy levels for these very neutron-rich nuclides.

A recent discovery made by ANL scientists was the first experimental proof of the existence of an octupole deformation in a nuclear ground state. The discovery of this peculiar state may make possible a determination of the strength of parity nonconserving interactions inside nuclei.

The FY 1984 request for Low Energy Nuclear Physics is $13,000,000. Except for closeout of work at the University of Colorado cyclotron and the University of Wisconsin tandem Van de Graaff accelerator, Low Energy Nuclear Physics activities will be continued at the FY 1982 level of effort.

	FY 1982	FY 1983	FY 1984 Request
Nuclear Theory	$ 7,700	$ 8,150	$ 9,000

The general goal of Nuclear Theory is to understand the structure and interactions of atomic nuclei in as basic a theoretical framework as possible. This remains a difficult task. Nuclei consist of many dynamically interacting bodies, even in the simplest cases. Progress until now has mostly been made at a phenomenological level by the formulation of models that simplify the description of complicated many-body behavior.

In the last year or so, however, an ever-increasing number of theorists have began to believe that we now, for the first time, actually know the underlying theoretical framework for nuclear physics. We can now hope to understand at a fundamental level the strong interactions between neutrons and protons (collectively called "nucleons"). These strong forces are responsible for the binding of nucleons into nuclei. What is now believed to be the theoretical basis for most nuclear phenomena involves subnuclear particles called "quarks," interacting through the exchange of "gluons." This theory goes by the name of Quantum Chromodynamics, or "QCD" for short. There has, thus, been a recent major change in many nuclear theorists' view of nuclei. An atomic nucleus is now no longer thought of as a collection of neutrons and protons (with mesons being exchanged between the nucleons). There is a quark and gluon substructure which, at some point, ought to show up experimentally.

Despite the appeal of the quark and gluon picture, we still do not know how to perform reliable calculations based on the QCD theory for the situations most often occurring in nuclear physics. There are serious problems in dealing with the fact that the quarks in a nucleus tend to cluster into groups of three. Even the spatial extent over which this clustering occurs is, and will continue to be, hotly debated. Other quark-related questions that will occupy center stage in FY 1984 include: (1) how and in what experiments can effects of the quark substructure in nuclei be best seen; (2) how are these effects to be distinguished from "less exotic" dynamical effects known to be present in nuclei (such as the above-mentioned exchange of mesons between nucleons); (3) to what extent can the forces between two nucleons be truly derived from QCD; and (4) what are the practical consequences of this new (and more complex) view of nuclear structure.

Besides development of the quark picture, nuclear theorists will also continue to study several longstanding questions of the field. In FY 1984, it is likely that there will still be a lively interest in "dibaryon resonances" (resonant interaction of two nucleons) because of recent experiments on the scattering of pions by deuterium nuclei.

There will be much discussion of new collective modes of nuclear excitations, again prompted by recent experiments. There will continue to be searches for new symmetries satisfied by energy levels in medium- and heavy-weight nuclei. There will be an increased emphasis on developing new methods of approximation to allow practical calculations of the properties of many-body nuclear systems.

As can be seen from the above discussion, there is a close relation between theoretical work and experiments. It is frequently the case that new experimental results stimulate new theoretical programs. Conversely, theorists often suggest new kinds of experiments to resolve outstanding theoretical problems. Thus, the Nuclear Theory subprogram supports strong theory groups at each of the institutions which host national accelerator facilities--Los Alamos National Laboratory, Massachusetts Institute of Technology, Lawrence Berkeley Laboratory, Oak Ridge National Laboratory, Argonne National Laboratory, and Brookhaven National Laboratory. In addition, outstanding theory groups are supported at State University of New York at Stony Brook, University of Washington, Yale University and University of Maryland. More modest, yet important, nuclear theory programs are also supported at some 25 other universities. These are widespread geographically and include institutions such as Brown University, University of Colorado, Florida State University, University of Iowa, and Oregon State University.

Nuclear theory, in recent years, has become increasingly involved with the formulation of sophisticated mathematical models. The predictions of these models usually come from extensive computer calculations. Examples are:

(1) The parameterization of the nucleon-nucleon interaction to summarize economically an extensive collection of data involving dependences on energy, angle, and spin direction (this is called a "phase shift analysis");

(2) Calculation of cross sections for the production of pions from nuclei when energies are well below the threshold for production in free nucleon-nucleon collisions;

(3) Investigation of the effects on nuclear structure when one of the "ordinary" quarks in a nucleus is replaced by a "strange" one (such nuclei are called "hypernuclei");

(4) Time-dependent descriptions of the scattering processes that occur when two heavy ions collide at moderate to high energies; and

(5) Detailed quantum mechanical calculations of how three strongly interacting bodies, such as nucleons, can form bound and resonant systems. In the near future, an increasing effort will be made to extend these methods to the even more complex four-nucleon system.

Nuclear theorists need increasing capability in, and access to, computers. An NSAC subcommittee has examined existing and projected computational requirements of theoretical nuclear research and found that additional computational capability was necessary to advance objectives of the Nuclear Theory subprogram. It recommended: (1) improved access of university-based scientists to national laboratory computers; (2) upgrade of networking capabilities; and (3) expanded use of midi-computers for those applications which do not require a large computer. Implementation of these recommendations has been initiated in FY 1982 and FY 1983 and will be a major effort in this subprogram in FY 1984.

The overall budget request for Nuclear Theory operating expenses in FY 1984 is $9,000,000. This is an increase of $1,300,000 over FY 1982. Such an increase in funds will allow nuclear theory to maintain FY 1982 levels of manpower in the field. It will also provide, as discussed above, a much needed increment in computing capability.

	FY 1982	FY 1983	FY 1984 Request
Capital Equipment	$ 9,510	$10,444	$11,300

In FY 1984, $11,300,000 is required for capital equipment. Of this total, $10,500,000 is needed for direct advancement of Nuclear Physics program objectives; $800,000 is needed for the laboratory-wide needs of the Lawrence Berkeley Laboratory for general purpose equipment. The capital equipment funds for programmatic use are needed to acquire experimental and computational equipment used by research scientists in the Nuclear Physics program as well as to acquire equipment which permits effective operation of the accelerators themselves. The most important type of capital equipment needed is for detection systems. New and more sophisticated kinds of particle and photon detectors, better magnetic analysis systems, and faster data acquisition and analysis systems are needed in a variety of programs to select those particular nuclear events which provide new information about nuclear phenomena. Computational equipment with interactive capabilities is needed to pursue new theories of nuclear structure and reactions and to enable the most effective confrontation between theory and experiment. In addition to these major items of equipment, there is a continuing need for upgrade of small, general purpose instrumentation--such as standard electronic modules.

At Argonne National Laboratory, a total of $1,800,000 is requested for new research equipment. Most of these funds are needed to equip the Argonne Tandem/Linac Accelerator (ATLAS) experimental area. A large scattering facility, gamma-ray facility, and a data acquisition computer, together with beam lines, switch magnets and beam rebunchers are needed in FY 1984 in order to prepare for the start of the experimental program with ATLAS in FY 1985.

The search for new phenomena at the Bevalac has created a need to construct two large spectrometers for the study of the very hot plasma generated in "head-on" collisions of relativistic heavy ions. One of these is the Dilepton Spectrometer (TEC = $3,000,000; $750,000 in FY 1984; $1,470,000 in FY 1985 and $780,000 in FY 1986), aimed at the study of direct lepton pair production. The Dilepton Spectrometer consists of an iron-free magnetic coil surrounded by an array of drift chambers, Cerenkov counters, calorimeters, and TOF hodoscopes. The main focus of the Dilepton Spectrometer project is to search for quark-antiquark contributions to the collision process. The other spectrometer, the Universal Two-Pion Spectrometer (TEC = $500,000; $250,000 in FY 1984 and $250,000 in FY 1985) is designed to study the correlation of pion pairs emitted from the hot plasma created in relativistic heavy ion collisions. This device permits new types of pion correlation experiments which can measure the sizes, lifetimes, and the coherence of the pion emitting region.

Also at Lawrence Berkeley Laboratory, a High Charge State Ion Source (TEC = $1,600,000; $650,000 in FY 1983 and $950,000 in FY 1984), using the electron cyclotron resonance principle, will essentially double the energy of the 88-inch Cyclotron for heavy ion beams and increase its beam intensity by a factor of ten. This will greatly enhance the research potential of this excellent facility.

At Los Alamos National Laboratory, an intense muon beam is available for an important series of experiments designed to observe rare muon decay. The observation of any decay mode of the muon which violates lepton number conservation laws would provide a very important benchmark test for unified theories connecting the electromagnetic, weak and strong interactions. For this work, a very sensitive detector system, called Advanced Mu-E-Gamma Detector (TEC = $900,000; $300,000 in FY 1982, $200,000 in FY 1983, and $400,000 in FY 1984), is required. Altogether the funding requested for LANL and LBL totals $5,650,000. A variety of smaller scale equipment projects are also needed beyond the major projects specifically discussed.

At Brookhaven National Laboratory, Bates Electron Linear Accelerator, and Holifield Heavy Ion Research Facility, a total of $3,050,000 is requested. Equipment for the Double MP Tandem Facility and the hypernuclear spectrometer is needed at Brookhaven. At Bates, advanced instrumentation is needed to exploit the higher energy beams from the newly completed Recirculator. Holifield needs a computer system to control operation of the Oak Ridge Isochronous Cyclotron and detectors for heavy ions and gamma rays as well as components to expand data acquisition systems.

The Nuclear Physics program has responsibility for providing for all of Lawrence Berkeley Laboratory's general purpose equipment. For efficient operation of the Laboratory plant and for personnel safety, obsolete equipment must be replaced on a continuing basis. In FY 1984, $800,000 is requested for all capital equipment that cannot be identified with specific programs. Some examples are: a network of intralaboratory computers and work stations to provide interactive access to the Central Computer Facility; computer-aided design systems for the electronics and mechanical engineering groups; and dosimetry equipment for the Medical Services Department.

	FY 1982	FY 1983	FY 1984 Request
Construction.............................	$12,000	$ 7,700	$13,700

The total FY 1984 request for construction funds for Nuclear Physics is $13,700,000 as indicated in the table which follows:

Nuclear Physics
Summary of Construction
(Dollars in Thousands)

Project Name	Project Number	FY 1984 Request	TEC
Accelerator Improvement Projects	84-ER-121	$ 3,500	$ 3,500
General Plant Projects	84-ER-122	2,200	2,200
University Accelerator Upgrade Project at the University of Washington and Yale University	84-ER-110	8,000	19,000
Total		$13,700	

Accelerator Improvement and General Plant funds are required in FY 1984 at Lawrence Berkeley Laboratory, Los Alamos National Laboratory, Stanford Linear Accelerator Center, and Bates Electron Linear Accelerator Facility in order to meet the demands of frontier nuclear research, improve efficiency of facility operations, and provide for personnel safety. The "University Accelerator Upgrade Project" is designed to strengthen the nuclear research capabilities of two of America's leading universities in this area of basic science. Authorization and appropriation are requested in FY 1984 for this project.

Accelerator Improvement Projects

Accelerator facilities have continuous need during their operating life for small modifications or additions which improve their performance and enhance their usefulness to the research program. These kinds of facility upgrades are provided for under Accelerator Improvement Projects.

In FY 1984, a total $3,500,000 is required for accelerator improvement projects. At the Stanford Linear Accelerator Center (SLAC), $1,650,000 is needed for a new electron injector to produce high-intensity electron beams in the energy range from 0.4 to 3.0 GeV. The intensities are expected to be about a factor of 100 greater than the currents now available at SLAC in this energy range. Thus, the new injector will permit experiments at SLAC which are of great importance to the Nuclear Physics program. These experiments will extend the range of our knowledge of nuclear form factors and structure toward much higher momentum transfer. The results will improve our understanding of basic nuclear interactions, in particular, the underlying quark structure of nuclei. In addition, the new injector will reduce operating costs, provide greater flexibility in scheduling of experiments, and achieve more reliable operation of the Stanford Synchrotron Radiation Laboratory which is operated by the Basic Energy Sciences program for materials, biomedical, and chemistry research.

At the Lawrence Berkeley Laboratory, $700,000 is needed at the Bevalac to increase the magnetic rigidity of the transfer line between the SuperHILAC and the Bevatron. This will result in improved operational flexibility and an increase by about a factor of ten in Bevalac beam intensity for the heaviest beams since one stripping stage will be eliminated. At Los Alamos National Laboratory, $500,000 is needed to improve operational efficiency of the LAMPF main beam stop and adjoining irradiation facilities by installation of advanced diagnostic instrumentation. At Bates, $650,000 is needed for work which will extend the capacity of the Bates radiofrequency power system by 20%. This upgrade is designed to increase the life of system components and to reduce accelerator downtime.

General Plant Projects

The construction request includes $2,200,000 for General Plant Projects (GPP) at the Lawrence Berkeley Laboratory, the LAMPF facility at Los Alamos, and the Bates Linear Accelerator at MIT. At these laboratories, the Nuclear Physics program has responsibility for GPP funds which provide for minor conventional construction such as building additions, alterations, and improvements as well as improvements to land and utility systems. A total of $1,500,000 is requested for projects at the Lawrence Berkeley Laboratory, including office space additions, upgrade of buildings to withstand earthquakes, electrical and mechanical utility upgrading, and road and pathways projects. At the LAMPF facility, $500,000 is required for an addition to the Data Analysis Center to provide space for computer and peripheral equipment. This improved computing capability is needed to advance both experimental and theoretical research conducted by outside users of LAMPF and by LANL staff scientists. At the Bates Laboratory, $200,000 is needed for improving the cooling capability for the RF gallery to avoid marginal operation or shutdown during summer months and for installing a storage and distribution system for flammable gases.

University Accelerator Upgrade Project at the University of Washington and Yale University

The project will greatly enhance the research capability of two key university accelerator facilities. At the University of Washington a superconducting linac booster capable of 25 million volts of accelerating power will be added to the existing FN tandem Van de Graaff. The booster will increase the energies of hydrogen ions from 18 MeV to 36 MeV. The energy of other ion beams will be at least doubled. These higher beam energies will enable expansion of the present work of the University of Washington's Nuclear Physics Laboratory with emphasis on light ion reaction studies, radiative capture, and studies of fundamental aspects of the nucleon-nucleon interaction. High quality polarized beams will be used for improved nuclear structure studies, for nuclear force symmetry problem studies, and for parity-violation studies exploiting longitudinal analyzing power measurements. The new linac booster will also provide light heavy-ion beams for the exploration of a projectile energy domain where a large fraction of the total reaction cross section goes into noncompound nuclear reactions.

At Yale University the MP tandem Van de Graaff accelerator will be upgraded in several important ways: (1) the acceleration tubes will be lengthened, (2) the voltage insulating column will be extended, and (3) the pressure vessel will be enlarged in the center region which surrounds the high voltage terminal. These changes will considerably extend the energy range for both light and heavy ion beams, since it will be possible to operate the accelerator at terminal potentials of 20 to 22 million volts, more than 50% higher than is presently possible. Thus, the upgraded accelerator will significantly advance the broad program of study that has characterized the Wright Nuclear Structure Laboratory at Yale University. In addition to basic nuclear physics, this program includes investigations in nuclear astrophysics, high energy atomic and molecular physics, as well as work in the interfaces between nuclear and material sciences and between nuclear and surface science. In nuclear research at Yale, recent emphasis has been on search for dynamic symmetries and simplicities underlying nuclear structure and dynamics, on study of the response of nuclear systems to extreme centrifugal stress, and on entirely new collective and molecular phenomena in the nuclear many body system. These research topics are important to advancing our understanding of nuclei and thus are of long term, continuing interest.

In FY 1984, $8,000,000 is required for these two upgrades for design, fabrication and procurement of components such as superconducting resonators, cryostats, acceleration tubes, high-voltage column structures, a pressure vessel, and beam transport magnets.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Nuclear Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-121

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $3,500
Less amount for PE&D: 0
Net cost estimate: $3,500
Date: 5/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$3,500	$3,500	$3,500	$2,000
1985	0	0	0	1,000
1986	0	0	0	500

8. Brief Physical Description of Project:

This project provides for additions, modifications, and improvements to major research accelerators and ancillary experimental facilities. The requested funds are necessary to maintain and improve reliability and efficiency of operations and to provide new experimental capabilities as required for execution of the planned research program.

Listed below are the laboratories and a description of each subproject:

Lawrence Berkeley Laboratory (Bevalac)... $ 700

This subproject will upgrade the magnetic rigidity of the transfer line between the SuperHILAC and the Bevatron by replacement of magnets and power supplies. Laminated magnets will be used to provide rapid beam switching capability.

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-121

8. Brief Physical Description of Project (continued):

Los Alamos National Laboratory (LAMPF)	$ 500

This subproject will improve the LAMPF main beam stop area by installation of improved beam line diagnostics, additional vertical penetrations, proton irradiation ports, and a new water degrader at the beam stop.

Massachusetts Institute of Technology (Bates Linear Accelerator)	$ 650

This subproject will add a sixth transmitter to the radiofrequency system which powers the Bates electron linac. Each transmitter consists of switchgear, an inductrol, a DC power supply, a capacitor bank, and a modulator which drives two klystrons.

Stanford Linear Accelerator Center	$1,650

This project will provide for the installation of an off-axis gun, injector, and trigger generator at the Stanford Linear Accelerator Center to provide electron beams suitable for nuclear research.

9. Purpose, Justification of Need for, and Scope of Project:

Lawrence Berkeley Laboratory (Bevalac)

The upgrade of the transfer line rigidity will eliminate the need to strip the beam at the SuperHILAC exit and thereby gain a beam intensity increase by about a factor of ten for high mass beams. Rapid switching capability will allow simultaneous running of two Bevalac experiments which require different kinds of heavy ion beams.

Los Alamos National Laboratory (LAMPF)

This beam stop upgrade will improve capability for monitoring conditions at LAMPF's main stop, reduce downtime, and provide new research capabilities. Beam diagnostic devices at the LAMPF main beam stop are subjected to a severe environment of radiation, heat, and moisture. The new beam stop configuration provided by this subproject will permit quick access for repair of diagnostic equipment, improve shielding of instruments, reduce air activation, and provide irradiation space for new experimental programs. The water degrader in the beam stop will produce a 30 percent enhancement in the production of electron neutrinos.

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 84-ER-121

9. Purpose, Justification of Need for, and Scope of Project (continued):

Massachusetts Institute of Technology (Bates Linear Accelerator)

With the existing radiofrequency power system configuration at Bates, the fifth transmitter is required to provide an energy gain per waveguide section which is 50% higher than any other transmitter. This extra burden on the fifth transmitter has led to increased downtime and shortened component life. At present the fifth transmitter is down approximately 15% of scheduled time. This subproject will permit the existing transmitters to operate at lower power levels and thus significantly improve component lifetime and overall radiofrequency power system reliability.

Stanford Linear Accelerator Center

The new injector will enable the SLAC linac to produce electron beams in the energy range 0.4 to 3.0 GeV at an intensity about a factor of 100 greater than what is now available in this energy range. This capability will permit important measurements of electric and magnetic form factors at high momentum transfer for electron scattering from nuclei with two, three, and four nucleons. These measurements could discriminate among competing theoretical models and shed light on the relative importance of meson exchange currents, isobars, and quark substructure in light nuclei. In addition, the new injector will result in lower operating costs and more reliable operation of the Stanford Synchrotron Radiation Laboratory, which is operated by the Basic Energy Sciences program for materials, biomedical, and chemistry research.

10. Details of Cost Estimate:

a. Engineering, design, inspection, construction, procurement, component assembly, and installation	$3,500
Total Project Cost	$3,500

11. Method of Performance:

Design will be by contractor staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontractors awarded on the basis of competitive bidding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Nuclear Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-122

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6 . Current cost estimate: $2,200
Less amount for PE&D: 0
Net cost estimate: $2,200
Date: 5/82

7. **Financial Schedule:**

Fiscal Year	Obligations	Costs FY 1982	Costs FY 1983	Costs FY 1984	Costs After FY 1984
Prior Year Projects	xxx	2,342	1,000	0	0
1982	$2,000	457	1,343	200	0
1983	2,200	0	600	1,000	600

locations:

Lawrence Berkeley Laboratory	$1,500

Requirements include: addition of office space to existing buildings for more efficient use of personnel resources ($950,000); upgrade of ability of Laboratory buildings to withstand earthquake damage ($150,000); utility upgrading ($200,000); roads, pathways, and miscellaneous projects ($200,000) to assure continued efficient and safe use of Laboratory facilities.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 84-ER-122

8. Brief Physical Description of Project - (continued):

Los Alamos National Laboratory (LAMPF) .... $ 500

Requirements include: a two-level addition to the Data Analysis Center to provide space for computers and peripheral equipment as well as space for personnel associated with instrumentation and computer systems activities so that the Data Analysis Center can meet the computational needs of LAMPF and its user scientists.

Massachusetts Institute of Technology (Bates Linear Accelerator)........................ $ 200

Requirements include: (1) upgrade of the cooling capability for the RF gallery to improve operational efficiency of the Bates Laboratory and to avoid unplanned shutdowns in hot weather and (2) construction of a flammable gas storage shed and distribution system.

9. Purpose, Justification of Need for, and Scope of Project:

This project is required to provide for minor new construction, other capital alterations and additions, and for improvements to land, buildings, and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under construction. Projects at the LAMPF facility at Los Alamos National Laboratory, William H. Bates Linear Accelerator Facility, and Lawrence Berkeley Laboratory, are needed to improve efficiency and productivity of these installations and to assure continuation of safe and reliable operations for both personnel and instrumentation.

The distribution of funds requested for FY 1984 is estimated as follows:

Lawrence Berkeley Laboratory	$1,500
Los Alamos National Laboratory (Anderson Meson Physics Facility)	500
Massachusetts Institute of Technology (Bates Linear Accelerator)	200
Total	$2,200

1. Title and location of project: General plant projects, various locations

2. Project No. 84-ER-122

10. **Details of Cost Estimate**

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs include engineering, design, and inspection.

11. **Method of Performance**

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts on the basis of competitive bidding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Nuclear Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

3. Date A-E work initiated: 2nd Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current Cost estimate: $19,000
Less amount for PE&D: 0
Net cost estimate: $19,000
Date: 12/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$8,000	$ 8,000	$ 8,000	$2,000
1985	11,000	11,000	11,000	8,000
1986				6,000
1987				3,000

8. Brief Physical Description of Project:

This project consists of two subprojects which provide for the addition of a superconducting linac booster to the University of Washington FN tandem Van de Graaff accelerator and the upgrade of the MP tandem Van de Graaff accelerator at Yale University.

1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

8. Brief Physical Description of Project (continued):

University of Washington

Principal additions and modifications are: (a) fabrication and installation of four superconducting linac sections which provide about 25 million volts (MV) of accelerating power; (b) improvement of the ion source system of the tandem accelerator; and (c) installation of a beam transport system to convey the beam from the tandem to the booster and from the booster into an existing experimental area. The main components of the proposed superconducting linac consist of an array of independently-phased resonators of the split-ring type. The technology for this system has been developed at Argonne National Laboratory where the resonators for the proposed linac will be fabricated and tested. All aspects of the technology (resonators, cryostats, beam bunching, rf control, etc.) have been thoroughly tested. The linac will fit entirely within existing shielded building space.

The booster will more than double the range of energies of ions available for nuclear research--for example, protons and deuterons from 18 million electron volts (MeV) to 36 MeV and oxygen ions from 88 to 240 MeV. New beams of heavier ions will be possible, for example, silicon ions at 350 MeV and calcium ions at 370 MeV.

The University of Washington will contribute the equivalent of approximately $1,000,000 to this project in the form of a liquid helium refrigeration system and services of personnel to do design and engineering work.

Yale University

Principal additions and modifications are: (a) extension of the acceleration tubes and insulating column structure; (b) replacement of the pressure tank; (c) installation of a polarized proton and deuteron ion source; (d) improvement of beam transport and analysis systems; and (e) upgrade of terminal charging and mechanical power systems. These modifications will provide the excellent beam energy resolution which is characteristic of electrostatic accelerators and will provide ease of beam energy variation for ion species throughout the periodic table. Heavy ions having atomic masses as high as 120 will have energies exceeding the Coulomb barrier on a uranium target; heavy ions up to uranium itself will have energies in excess of 2.5 MeV per nucleon. Light ion beams--of very great importance for investigations of the structure of nuclear states at high excitation energies--will be available in the energy ranges up to 44 MeV for hydrogen ions, 66 MeV for helium ions, and 88 MeV for lithium ions.

1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

8. Brief Physical Description of Project (continued):

The existing structure uses four eight-foot long accelerating tube sections on either side of the high voltage terminal. This number will be increased to five by adding an additional section to each end of the present MP electrostatic column, and each tube section will be increased in length from 72 to 88 inches by extension into former intertube dead spaces. The existing pressure tank has an internal diameter of 18 feet in the terminal region and a pronounced taper to small diameter at its ends; this tank will be replaced with one having a 25 foot internal diameter in the terminal region and much reduced taper. With these changes, based on operational experience at well above 13.5 MV on terminal, terminal potentials in the proposed configuration can conservatively be anticipated at 20 MV with 22 MV as a realistic design goal.

Certain additional changes to the accelerator will be reuired. In order to ensure adequate charge carrying capacity by the existing charging chains at higher terminal potentials, the chains will be freed of their current function of transmitting some 6 KW of mechanical energy to the terminal. For this purpose, a rotating shaft mechanical power system will be installed in parallel with the chains. Because addition of the new components such as foil strippers, cyropumps, and electrostatic quadrupole lenses to the existing terminal would overcrowd the available space in the eight-foot long present structure, the terminal length will be increased by two feet during the conversion. This increase, together with the two additional column sections, implies a new tank some 20 feet longer than the current one, i.e., 100 rather than 80 feet. The existing electrostatic column and its associated hardware, resistors, etc., will be transferred directly to this new tank with the addition of the new column extensions.

Because detailed studies of the characteristics of insulating gas mixtures have shown that an appropriate mixture of gases can provide better voltage holding charateristics than pure sulphur hexafluoride now in wide use, a stronger tank than usual for electrostatic accelerators will be installed to permit operation up to 175 pounds per square inch.

Since this subproject will provide substantially improved energy performance for all ions, particularly in mass regions above those now in use at Yale, the primary 90° momentum analyzing magnet, the high energy magnetic quadropole lens and the switching magnet will be replaced with units appropriate to the higher magnetic rigidities which will become available.

1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

8. Brief Physical Description of Project (continued):

The new tank will fit within the existing laboratory vault so that the only building modifications required are the opening and closing of one of its corners to permit exchange of the pressure tanks and the provision of new footings and pads for the larger tank. All of the modifications and improvements that have been made to the MP accelerator since its commissioning in 1966, and such ancillary units as the injector and gas handling system, will be directly transferred to the upgraded accelerator.

A further enhancement of the accelerator facility will be provided by the addition of a polarized proton and deuteron ion source and facilities for bunching and pulsing the accelerator beam. New beam lines and a switching magnet will also be provided for the second target room.

9. Purpose, Justification of Need for, and Scope of Project

This project will greatly strengthen the research capabilities at the Nuclear Physics Laboratory of the University of Washington and at the Wright Nuclear Structure Laboratory of Yale University. The increased beam energies and expanded range of ion species will enable forefront nuclear physics experiments to be performed in these university laboratories, which have a history of training high quality nuclear science graduates.

University of Washington

The new superconducting booster facility will open new areas of research in light-ion nuclear physics. The factor-of-two greater energy, high beam quality, variable energy of the beam, and availability of a high-intensity polarized ion source will enable expansion of the present work of the University of Washington laboratory. Emphasis will be placed on light ion reaction studies, radiative capture, and studies of fundamental aspects of the nucleon-nucleon interaction. High quality polarized beams will be used for improved nuclear structure studies, for nuclear force symmetry problem studies, and parity-violation studies exploiting longitudinal analyzing power measurements in systems like proton + proton and neutron + proton. The characterization of the symmetry properties of the strong part of the nuclear force and the parity-violating component of the weak part of the nuclear force are two of the leading contemporary problems in understanding nuclear forces.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
General Science Program Direction
Basic Sciences
General Science and Research - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
General Science Program Direction - Operating Expenses................	$ 1,713	$ 1,413	$ 2,035	$ 2,250
Total.....................	$ 1,713*	$ 1,413*	$ 2,035	$ 2,250
Staffing				
FTP/Total FTE's........	30/32	30/32	30/32	33/35

*Reflects comparability adjustment from Policy and Management - Energy Research of $575,000 and $272,000 in FY 1982 and FY 1983, respectively, for support associated with the programs and transfer to Biological and Environmental Research of $222,000 in FY 1982 for 4 FTE's associated with the Life Sciences Research and Nuclear Medicine Applications Program.

Authorization: Section 209, P.L. 95-91

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
General Science Program Direction
(dollars in thousands)

FY 1983 Appropriation..	$ 1,413
Increased personnel costs...	622
FY 1984 Base..	$ 2,035
Program increase related to 3 additional FTE's..........................	215
FY 1984 Budget Request..	$ 2,250

General Science Program Direction

The FY 1984 budget request for General Science Program Direction is $2,250,000. This represents an increase of $837,000 over FY 1983 which excludes prior year unobligated balances needed for program execution. These funds are required to provide for the salaries, benefits, travel and other expenses associated with 35 full-time equivalents in the Office of the Associate Director for High Energy and Nuclear Physics, the Division of High Energy Physics, the Division of Nuclear Physics, and associated support staff required to administer these programs. This represents an increase of 3 full-time equivalents above the FY 1983 level. The requested funding will provide for the additional full-time equivalents and normal increased personnel costs such as within-grade and merit increases and benefits. The funding request further reflects the impact on average salaries of the FY 1982 and FY 1983 pay cap increases and two general pay increases in FY 1982 and FY 1983.

This staff is responsible for providing effective management, planning and direction to ensure that a viable, high quality national program of basic research is carried out in the fields of high energy physics and nuclear physics. To carry out these responsibilities, the staffs assess the basic research needs in these areas with advice from the appropriate advisory committees, High Energy Physics Advisory Panel (HEPAP) and Nuclear Science Advisory Committee (NSAC); and develop and coordinate with appropriate agency and external communities a coherent policy and long-range plan for support of balanced national programs in high energy and nuclear physics. The staff develops program budget requests and justification; optimizes the allocation of resources to the laboratories and universities supported by the agency so as to achieve the maximum research productivity, cost effectiveness and efficiency of operation; and provides technical oversight for high energy and nuclear physics research programs at 10 major laboratories and for about 150 university contracts and 4 major construction projects.

The high energy physics staff oversees operation of three large, complex high energy accelerator centers at BNL, Fermilab, and SLAC for use on a national basis by qualified physicists. The staff will continue to oversee major ongoing construction projects, including at Fermilab the Tevatron I with scheduled completion in FY 1986 and Tevatron II with scheduled completion in FY 1985. In addition, construction will begin at an accelerated pace in FY 1984 on the Stanford Linear Collider to test the validity of current scientific theories relating to basic forces in nature.

Success of the Nuclear Physics program depends upon effective operation of seven large and complex national accelerator facilities. High priority, new capabilities at LBL (Uranium Beams Project), ORNL (Holifield Heavy Ion Research Facility), and ANL (ATLAS Construction Project) require increased program resources to manage the research for which they were designed. The difficult task of reallocation of funds and reductions in lower priority programs will be a central feature of FY 1984 staff activities. This staff will also oversee the new initiative to upgrade nuclear physics accelerators at Yale and the University of Washington to strengthen university research capabilities.

The High Energy and Nuclear Physics staff will also manage the Heavy Ion Fusion Research program budgeted under Basic Energy Sciences. FY 1984 activities will involve overall policy and program planning and management, review and evaluation of the first stage of research and development activities carried out under laboratory projects. This will include site visits to evaluate progress toward development of heavy ion accelerator technology, responding to inquiries, and developing and maintaining a communications network with other interested parties.

Coordination of high energy and nuclear physics activities is accomplished by staff participation in annual on-site reviews of contractors; meetings of laboratory program advisory committees; special facility and research planning meetings; and regional, national, and international research meetings, and technical workshops. Additional staff is critical to these programs to assist in maintaining a world leadership position and will be involved in planning and managing the expanded research programs to ensure a viable, high quality program of basic research; coordination and evaluation of major new R&D projects; and management oversight of ongoing and major new construction projects including accelerator improvement and general plant projects. Permanent staff support is required to provide continuity in the development and implementation of long-range planning of these critical and complex programs of scientific data and instrumentation.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

URANIUM ENRICHMENT

VOLUME 4

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1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

9. Purpose, Justification of Need for, and Scope of Project (continued):

University of Washington (continued)

The new linac booster will also provide light heavy-ion beams for the exploration of a projectile energy domain where a large fraction of the total reaction cross section goes into noncompound nuclear reactions. This domain is fertile ground for learning about the dynamic behavior of nuclear matter under extreme conditions. The availability of light heavy ions in the 10-20 MeV/nucleon range enables exploration of the energy region where there are indications of a transition from the predominantly two-body exit channels of low energy reactions to the fragmentation mechanisms characteristic of very high energy nuclear collisions. It is in this energy region where the projectile velocity becomes comparable to the velocity of sound in nuclear matter, and thus we will be able to assess the relevance of this transition point in determining the dynamical behavior of nuclear matter.

Yale University

The proposed conversion of the MP tandem accelerator will greatly increase the research potential of the Wright Nuclear Structure Laboratory and permit experiments that could not have been performed there previously. Use of the polarized ion source, for example, will permit further investigation of the breakdown of time reversal invariance reported by a Laval-Berkeley collaboration. In this experiment, unexpectedly large differences were reported between the inverse reactions comparing Li-7 plus He-3 going to Be-9 plus polarized protons versus polarized protons on Be-9 going to Li-7 plus He-3. Use of 35-45 MeV polarized and unpolarized beams of protons and deuterons can surmount the Coulomb barrier in order to do spectroscopic studies on very heavy nuclei. In these studies, single-particle transfer reactions and measurements of electromagnetic transition operators are vital to testing the interacting boson-fermion approximation (IBFA) model of nuclear structure. The upgraded accelerator will also be capable of doing these transfer reactions with heavy ion beams using, for example, the reaction which converts oxygen-18 to oxygen-17 by "transferring" a neutron to the target nucleus.

1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

9. Purpose, Justification of Need for, and Scope of Project (continued):

Yale University (continued)

The enhanced heavy ion capability of the upgraded facility will also permit extensions of the Laboratory's long established program in quasi-molecular resonance studies. For the first time, Yale scientists can extend the measurements to systems such as Si + Si, which has shown surprising oscillatory cross sections even though the silicon nucleus is known to be oblate in its lowest energy state. Higher energy resonance investigations of oxygen plus oxygen systems have given hints of cluster structure. For example, silicon plus alpha particle structures are detected in the decay of the compound system. Use of very heavy systems, such as Ni + Ni, will extend the pioneering work of Yale investigators on atomic-nucleus coupling. Yale scientists will attempt to determine the time scale of compound nucleus formation by identifying the K X-rays ejected as the nuclear reaction proceeds to completion.

In addition to providing unique probes of nuclear structure and dynamics in regions inaccessible to facilities of lesser precision and flexibility, the upgraded accelerator will permit continuation of the very broad program of study that has characterized the Wright Laboratory since its founding. Augmenting the core nuclear physics studies, this program includes nuclear astrophysics, high energy atomic and molecular physics, as well as very active programs in the interfaces between nuclear and materials science and between nuclear and surface science. The Yale program has spanned a range of studies from those on the fundamental natural forces, through nuclear structure and dynamics, to very applied ones on such topics such as the behavior of hydrogen in inner wall materials of possible fusion reactors and the hydration of possible glasses to be used in nuclear waste isolation. In all of these studies, the unique beam properties and flexibility of the Van de Graaff beam have been essential. These experiments have raised new and interesting questions which require higher energies and intensities for their solution.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: University Accelerator Upgrade Project at University of Washington and Yale University Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

10. Details of Cost Estimate:*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 10% of item b		$ 1,430
b. Construction and special equipment costs		
University of Washington Subproject		6,170
1. Acceleration structures	$ 2,400	
2. Cryostats	1,200	
3. RF system	380	
4. Cryogenic distribution system	240	
5. Beam bunching and transport system	990	
6. Tandem injection upgrade	300	
7. Installation	660	
Yale University Subproject		8,140
1. Pressure tank	2,360	
2. Column sections, power drive shaft, acceleration tubes, resistors, and assembly hardware	2,850	
3. High voltage terminal modification, charging chain extension, and insulating gas	350	
4. Polarized proton and deuteron ion source	650	
5. Pulsing and bunching systems	240	
6. Beam transport equipment	820	
7. Installation	870	
Subtotal		$15,740
c. Contingency at approximately 20% of items a and b.		$ 3,260
Total estimated cost		$19,000

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* Cost estimate based on scientific proposals.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: University Accelerator Upgrade Project at
University of Washington and Yale University
Seattle, Washington and New Haven, Connecticut

2. Project No. 84-ER-110

11. Method of Performance

For the subproject at the University of Washington, all of the procurement except for the acceleration structures will be accomplished by fixed-price contracts, awarded on the basis of competitive bids. It is expected that the acceleration structures will be purchased from Argonne National Laboratory on a cost recovery basis.

For the subproject at Yale University, the major fraction of the components required will be procured on a fixed price basis from High Voltage Engineering Corporation which is the sole source for these components. The remaining components will be procured on a competitive fixed-price basis. Many aspects of the installation will be subcontracted by Yale on a competitive basis. High Voltage Engineering Corporation will provide installation supervision (including guarantee of mechanical integrity of the converted electrostatic structure).

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding							
1. Total facility costs							
a. Construction	$0	$2,000	$8,000	$6,000	$3,000	$ 0	$19,000
b. Facility operating costs	0	0	500	500	1,000	1,000	3,000
c. Capital equipment costs	$0	0	500	1,000	500	0	2,000
Total Facility Costs	$0	$2,000	$9,000	$7,500	$4,500	$1,000	$24,000
b. Other related funding requirements							
1. Programmatic operating costs directly related to the facilities							$1,000
Total other related annual funding requirements							$1,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	University Accelerator Upgrade Project at University of Washington and Yale University Seattle, Washington and New Haven, Connecticut	2. Project No. 84-ER-110

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
   1. Total facility costs
      Construction line item - explained in items 8, 9, and 10.

b. Other related funding requirements
   The estimated incremental annual cost beyond FY 1988 of performing physics research by the University of Washington and Yale University faculty, graduate students, and postdoctoral fellows is $500,000 in FY 1983 dollars at each institution.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Uranium Supply and Enrichment Activities

As authorized by section 111(h) of Public Law 93-438, as amended, revenues received from the enrichment of uranium shall be credited to this account, to remain available until expended, and used for expenses of energy activities in connection with operating expenses, the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for uranium supply and enrichment activities in carrying out the purposes of Public Law 95-91, or successor legislation, including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 49 of which 48 are for replacement only): Provided, That obligations thus incurred may not exceed $2,240,000,000: Provided further, That within these limits, obligations may be incurred in advance of uranium enrichment revenues and shall be liquidated from such collections.

Explanation of Change

FY 1983 Continuing Resolution did not provide specific appropriation language for this account, therefore, new language is proposed for FY 1984.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

URANIUM ENRICHMENT

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5	1	1	1
ES-4	6	5	5
ES-3	3	3	3
ES-2	2	2	2
ES-1	2	2	2
SUBTOTAL	14	13	13
GS-18			
GS-17			
GS-16			
GS/GM-15	19	9	10
GS/GM-14	20	13	12
GS/GM-13	16	14	13
GS-12	4	4	2
GS-11	9	3	3
GS-10			
GS-9	8	2	2
GS-8	8	2	2
GS-7	9	9	5
GS-6	14	8	4
GS-5	5	2	1
GS-4	4	2	1
GS-3	3	2	1
GS-2			
GS-1			
SUBTOTAL	119	70	56
UNGRADED			
TOTAL PERMANENT POSITIONS	133	83	69
UNFILLED POSITIONS, END OF YEAR	7		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	126	83	69

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATIONS
URANIUM ENRICHMENT-OPERATING EXPENSES
URANIUM ENRICHMENT-PLANT AND CAPITAL EQUIPMENT
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$1,834,319	$2,240,000
Proposed Supplementals:	-	-
Comparative Transfer To:	-	-
Comparative Transfer From:	-	-
Subtotal, Budget Authority	$1,834,319	$2,240,000
Receipts and Reimbursements:		
Unobligated Balances, Start of Year ..	8,411	-
Unobligated Balances, End of Year	-	-
Total, Obligations	$1,842,730	$2,240,000

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

URANIUM ENRICHMENT

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Uranium Enrichment Activities	1,704,284	1,882,853	2,163,100
Uranium Resource Assessment	9,979	5,000	—
Advanced Isotope Separation Technology	85,237	50,633	73,000
Program Direction	3,493	3,650	3,900
Subtotal, Uranium Enrichment	1,802,993	1,942,136	2,240,000
Revenues	-1,883,672	-1,968,319	-2,240,000
Total, Uranium Enrichment	-80,679	-26,183	—

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

URANIUM ENRICHMENT

Uranium Enrichment Activities

The FY 1984 budget for the uranium enrichment activities has been structured to enhance the competitive position of the United States in the international market by reducing costs and corresponding separative work prices to the maximum extent possible. Additional reductions have been made in all budget categories beyond those made in FY 1982 and 1983.

The requested budget for the uranium enrichment activities program is $2,240,000,000. With the application of commercial and government revenues totaling $2,240,000,000, the net uranium enrichment appropriation request for FY 1984 is $0.

The goal of the uranium enrichment activities program is to meet domestic, foreign and United States Government requirements for uranium enrichment services in the most economical, reliable, safe and environmentally acceptable manner possible.

Uranium as found in nature contains about seven-tenths of one percent uranium 235 which is fissionable. The remainder is essentially uranium 238 which is nonfissionable. The fissionable characteristics of uranium 235 make it desirable to enhance its concentration for use as nuclear fuel. Light water reactors typically require uranium 235 concentrations in the two to four percent range.

The Department presently enriches uranium to the desired uranium 235 product assay levels in its gaseous diffusion plants located at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. These plants were built in the 1940's and 1950's and were operated initially to satisfy defense requirements for uranium 235. They are now operated primarily to provide enrichment services to domestic and non-United States utility customers. In these plants, the Department enriches customer-provided natural uranium in the uranium 235 component for a fee which recovers the cost of providing the services. The Department is, by legislation, the sole supplier of enrichment services in the United States. The specific statutory authority which established this role is the Atomic Energy Act of 1954, as amended.

The Department conducts extensive analyses of uranium enrichment services supply and demand, economics and capacity expansion options from which is derived a long-term enrichment strategy to achieve program goals. This strategy recognizes near-term demand reductions as well as longer-term demand increases, and seeks to optimize the agency's production and expansion capabilities to achieve a balanced and economically attractive program. The FY 1984 budget was established following a recent comprehensive study of alternatives available to the agency to satisfy demands for enrichment services.

In the short-term the low operating levels of the gaseous diffusion complex require power purchases below existing contract levels. Therefore, the Department must pay capacity charges to its power suppliers for power not purchased to the extent that efforts to negotiate reduced power levels are unsuccessful. In FY 1984, the complex will operate at 3,190 megawatts or 530 megawatts above the FY 1983 level. This increase is necessary following the completion of technical studies which concluded that the minimum power level should be raised to 3,190 megawatts. The 3,190 megawatt level represents an acceptable level of risk of equipment failure from prolonged operations below plant design levels. Continued operation below 3,190 megawatts results in unacceptable levels of risk, particularly the risk of equipment failures that could result in the loss of plant capacity, the release of radioactive material, and a safety risk to employees. Continued operation at lower power levels also jeopardize the Department of Energy's ability to meet all scheduled customer deliveries in a timely manner.

The Gas Centrifuge Enrichment Plant is required to maintain the United States competitive position in the international market. The justification for the Gas Centrifuge Enrichment Plant can be summarized quite simply: without the Gas Centrifuge Enrichment Plant the United States will price itself out of the enrichment business. Extensive Department of Energy economic analyses have concluded that construction of the Gas Centrifuge Enrichment Plant yields superior benefits both to the Government and its customers in terms of improved economics and production reliability. The Gas Centrifuge Enrichment Plant will provide an additional 2.2 million separative work units of capacity by 1989. The Gas Centrifuge Enrichment Plant will be completed by adding capacity in increments of 1.7 million separative work units as rapidly as possible to a total capacity of 13.2 million separative work units. This budget request would maintain the schedule for completion of the full eight building Gas Centrifuge Enrichment Plant in 1994.

The FY 1982 accomplishments and anticipated FY 1983 accomplishments include:

- 9.8 million separative work units were produced in FY 1982 and 9.8 million separative work units will be produced in FY 1983.
- The Cascade Improvement Program (CIP) and Cascade Uprating Program (CUP) have increased the annual separative work capacity of the gaseous diffusion plants by 10.0 million separative work units per year through FY 1982. Completion of the CIP/CUP at all sites will occur in FY 1983, bringing the total additional gaseous diffusion capacity to 10.1 million separative work units per year.
- The Gas Centrifuge Enrichment Plant project is on schedule and within cost, construction of process and recycle assembly facilities has started, and the centrifuge and critical material manufacturers are on-board.
- The Set IV centrifuge machine concept features were selected in FY 1982.
- Initiation of the Gas Centrifuge Enrichment Plant startup activities to support the schedule for the on-stream operational date for the first production train of centrifuges by FY 1985 and the first process building in FY 1988.
- The selection of the Atomic Vapor Laser Isotope Separation process as the process to enter engineering development for the Advanced Isotope Separation program.

The specific objectives for FY 1984 to FY 1988 are:

- Production of 12.1 million separative work units in FY 1984.
- Initiate construction of the third Gas Centrifuge Enrichment Plant process building in FY 1985 and the fourth process building in FY 1986.
- Continue the Gas Centrifuge Enrichment Plant startup activities to support the schedule for the on-stream operational date for the first production train of centrifuges by FY 1985 and the first process building in FY 1988.
- Operate the Gas Centrifuge Enrichment Plant Recycle/Assembly Building assembly line in FY 1985.
- Prototype Set IV centrifuge machines will be built and reliability testing will begin at the end of FY 1985.
- Complete preliminary assessment of materials and design concepts for the advanced Set V gas centrifuge.
- Complete performance measurements package for detailed design of the Atomic Vapor Laser Isotope Separation uranium collector subsystem in FY 1984.
- Initiate Title I design on the Atomic Vapor Laser Isotope Separation Development/Demonstration Module in FY 1984 and construction in FY 1985.

Uranium Enrichment Revenues

The Department of Energy's charges for uranium enrichment services are based on recovery of the Government's costs over a reasonable period of time, in accordance with Section 161v of the Atomic Energy Act and with the Uranium Enrichment Services Criteria. The costs of providing enrichment services include the electric power supplied to the enrichment plants, the direct and indirect labor needed to operate the plants, process development, Department of Energy's administration, depreciation of plant and equipment, and imputed interest on the Government's investment in uranium enrichment.

Revenues in FY 1983 are estimated to be $1,968,319,000 from the sale of 13.4 million separative work units to commercial customers and 1.2 million separative work units to government customers.

Revenues in FY 1984 are estimated to be $2,240,000,000 from the sale of 14.6 million separative work units to commercial customers and 2.0 million separative work units to government customers.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Nuclear
Uranium Enrichment - Operating Expenses
Uranium Enrichment - Plant and Capital Equipment

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982[1] Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Uranium Enrichment Activities (NE)				
Gaseous Diffusion Operations and Support:				
Operating Expenses	$ 935,818	$1,097,953[4]	$1,097,953[4]	$1,400,400
Capital Equipment	23,600	21,600	21,600	9,900
Construction	69,650[2]	80,800[2]	80,800[2]	71,000
Subtotal	1,029,068	1,200,353	1,200,353	1,481,300
Gas Centrifuge Operations and Support:				
Operating Expenses	81,200	86,200	86,200	106,400
Capital Equipment	3,600	3,800	3,800	3,400
Construction	590,416	592,500	592,500	572,000
Subtotal	675,216	682,500	682,500	681,800
Advanced Isotope Separation:				
Operating Expenses	79,087	47,233	47,233	59,900
Capital Equipment	5,500	2,500	2,500	9,500
Construction	650	900	900	3,600
Subtotal	85,237	50,633	50,633	73,000
Program Direction:				
Operating Expenses	3,493[3]	3,650[5]	3,650[5]	3,900
Total:				
Operating Expenses	1,099,598	1,235,036	1,235,036	1,570,600
Capital Equipment	32,700	27,900	27,900	22,800
Construction	660,716	674,200	674,200	646,600
Total Uranium Enrichment Activities	$1,793,014	$1,937,136	$1,937,136	$2,240,000
Staffing FTP/Total FTE's	72/76	67/67	67/67	69/69

Authorization: Sec. 16, P.L. 88-489

1/ Excludes comparability adjustment in FY 1982 for the cost of UESA Services associated with miscellaneous revenues. The funds were budgeted in the Departmental Administration Appropriation.

2/ Reflects comparability adjustment of $350,000 for general plant project funds for the Technical Information Center.

3/ Reflects comparability adjustment of $812,000 to Policy and Management.

4/ Includes $109,000,000 transferred from Defense Programs for Uranium Enrichment Services.

5/ Reflects comparability adjustment of $833,000 to Policy and Management.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
URANIUM ENRICHMENT ACTIVITIES
(In thousands of dollars)

FY 1983 Appropriation enacted	$1,937,136[1/]
Built in increases and decreases:	
Pay cost supplemental	0
FY 1984 base	$1,937,136[1/]
Program increases and decreases:	
Gaseous Diffusion Operations and Support	
o Increased cost of minimum power level	+280,947
Gas Centrifuge Operations and Support	
o Increased GCEP startup operating funding and reduced GCEP construction funding, maintains 1994 completion schedule	-700
Advanced Isotope Separation	
o Continues development of the AVLIS process	+22,367
Program Direction	
o Funds primarily for FTE's in the Office of Uranium Enrichment and Assessment and increased contractual services	+250
FY 1984 budget request	$2,240,000

[1/] Includes $109,000,000 transferred from Defense Programs for Uranium Enrichment Services.

PROGRAM BUDGET JUSTIFICATION

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Request
Gaseous diffusion operations and support	$1,029,068	$1,200,353	$1,481,300

Funding for this activity is required for the operation of the gaseous diffusion plants at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. Uranium enriched in the fissionable isotope U-235 is produced in these plants to meet utility customer and United States Government requirements for nuclear fuel. Funds are included for all of the operating and support requirements for the continued operation of the three diffusion plants and to assure that these plants are maintained in a reliable and safe manner. Funds are included for the purchase of cascade power, diffusion operations, process and long-range technical support, supporting services, change in inventories, and cost of UESA services requirements. In addition, funds are included for necessary capital equipment to support the operational requirements of the plants.

Funds are also requested for the following line item construction projects: (1) UF$_6$ cylinders; (2) intermediate gas removal; (3) power system protection improvements; (4) general plant projects; (5) utilities upgrading, Phase II and III; (6) replacement of electrical circuit breakers; (7) compliance with toxic substances control act; (8) improved UF$_6$ containment; and (9) environmental protection and safety modifications, Phase I and II.

Gaseous diffusion operations and support - operating expenses

Cascade power	$ 802,000	$ 884,000	$1,184,000
Diffusion operations	92,942	165,553	168,300
Process and long range technical support	17,075	18,000	17,900
Supporting services	25,125	26,500	22,800
Change in inventories	-1,324	3,900	2,100
Cost of UESA services	0	0	5,300
Subtotal, operating expenses	935,818	1,097,953	1,400,400

Cascade power	$ 802,000[1/]	$ 884,000[2/]	$1,184,000[3/]

Operation of the gaseous diffusion plants requires large amounts of electric power to pump the process gas (UF$_6$) through the separating stages. Electric power is obtained under long-term contracts from the following suppliers: Tennessee Valley Authority (TVA) - Oak Ridge and Paducah; Electric Energy Incorporated (EEI) - Paducah; and Ohio Valley Electric Corporation (OVEC) - Portsmouth.

[1/] Includes $166,000,000 for capacity charges for power not purchased under the contracts with DOE's three power suppliers. It is assumed that DOE will be relieved from an additional $40,000,000 in capacity charges for power not purchased from OVEC.

[2/] Includes $151,000,000 for capacity charges for power not purchased under the contracts expected to be in effect in FY 1983 with DOE's three power suppliers. Includes $109,000,000 transferred from Defense Programs for Uranium Enrichment Services.

[3/] Includes $226,000,000 for capacity charges for power not purchased under the contracts expected to be in effect in FY 1984 with DOE's three power suppliers. It is assumed that DOE will be relieved from an additional $17,000,000 in capacity charges for power not purchased from OVEC. If DOE is required to pay these capacity charges, the cascade power budget will be $1,201,000,000.

Power from EEI and OVEC is obtained from generating stations with a portion or all of the capacities of these stations serving DOE. DOE pays a proportionate share of the total costs incurred by the suppliers for the power it purchases. Power from TVA is purchased from the TVA system at rates patterned after TVA standard industrial rates. TVA can adjust its rates on a quarterly basis to assure meeting bonding and TVA Act requirements to provide an adequate margin of revenues over costs.

In the short-term the low operating levels of the gaseous diffusion complex require power purchases below existing contract levels. Therefore, the Department must pay capacity charges to its power suppliers for power not purchased to the extent that efforts to negotiate reduced power levels are unsuccessful. In FY 1984 capacity charges for power not purchased will total $243,000,000 (TVA - $226,000,000; OVEC - $17,000,000). It has been assumed that DOE will be relieved of the $17,000,000 for OVEC capacity charges and the funds are not included in the FY 1984 budget request. At this time, however, DOE is still under contractual obligation to pay these capacity charges. DOE has been, and will continue, negotiating with the power suppliers in an attempt to reduce or eliminate these capacity charges.

Purchased power includes cascade power, power used by the Oak Ridge National Laboratory, the Y-12 complex at Oak Ridge, non-process users at all gaseous diffusion sites, and line losses. Cascade power is the portion of purchased power which is used to operate the gaseous diffusion process equipment and auxiliaries.

The contract demand, purchased power, cascade power, unit costs, and total costs for FY 1983, based on the total cascade power budget of $884,000,000, are summarized below:

FY 1983 CASCADE POWER

	PURCHASED POWER				CASCADE POWER			CAPACITY CHARGES FOR POWER NOT PURCHASED
	CONTRACT DEMAND MW-YR	POWER LOAD MW-YR	UNIT COST MILLS/KWH	COST $000	POWER MW-YR	UNIT COST MILLS/KWH	COST $000	$000
Oak Ridge								
TVA	1,600	800	46.4	$325,000	672	51.8	$305,000	$ 73,000
Paducah								
TVA	1,565	952	42.7	356,000				56,000
EEI	123	123	28.8	31,000				
Subtotal	1,688	1,075	41.1	387,000	1,044	42.3	387,000	56,000
Portsmouth								
OVEC	1,260	785	27.6	190,000	752	29.1	192,000	22,000
Three-Site TOTAL	4,548	2,660	38.7	$902,000	2,468	40.9	$884,000[1]	$151,000

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[1] Assumes usage of $109,000,000 from Defense Programs.

The contract demand, purchased power, cascade power, unit costs, and total costs for FY 1984 are summarized below:

FY 1984 CASCADE POWER

	PURCHASED POWER				CASCADE POWER			CAPACITY CHARGES FOR POWER NOT PURCHASED
	CONTRACT DEMAND MW-YR	POWER LOAD MW-YR	UNIT COST MILLS/KWH	COST $000	POWER MW-YR	UNIT COST MILLS/KWH	COST $000	$000
Oak Ridge								
TVA	1,902	950	52.5	$ 438,000	825	57.5	$ 417,000	$ 95,000
Paducah								
TVA	1,884	565	67.7	336,000				131,000
EEI	735	735	27.9	180,000				
Subtotal	2,619	1,300	45.2	516,000	1,266	46.6	518,000	131,000
Portsmouth								
OVEC	1,260	940	29.6	244,000	901	31.5	249,000	17,000[1/]
Three-Site								
TOTAL	5,781	3,190	42.8	$1,198,000	2,992	45.1	$1,184,000	$243,000

The EEI purchased power unit cost decreases from FY 1983 to FY 1984 because the increased purchases by DOE from EEI result in the fixed costs being spread over a larger base. The TVA purchased power unit cost increases dramatically because of increased capacity charges for power not purchased. The contract power which DOE will not be purchasing from TVA increases from 1,413 megawatts in FY 1983 to 2,271 megawatts in FY 1984.

In FY 1984, the enrichment complex will operate at 3,190 megawatts or 530 megawatts above the FY 1983 level. This increase is necessary following the completion of technical studies which concluded that the minimum power level should be raised from 2,660 megawatts to 3,190 megawatts. The 3,190 megawatts level represents an acceptable level of risk of equipment failure from prolonged operations below plant design levels. Continued operation below 3,190 megawatts runs a real risk of equipment failures that could result in the loss of plant capacity, the release of radioactive material, and a safety risk to employees.

The budget for FY 1983 is estimated at $884,000,000. This includes capacity charges for power not purchased totaling $151,000,000 (TVA-$129,000,000, OVEC-$22,000,000). DOE has been negotiating with the suppliers to reduce power deliveries and the capacity charges for power not purchased. OVEC has DOE's request under review. To date, DOE and TVA have not been able to reach a mutually acceptable arrangement under which DOE would receive capacity charge relief. Negotiations with TVA will continue.

[1/] OVEC capacity charges have been excluded from the FY 1984 budget request. However, DOE is contractually obligated to pay these capacity charges.

Diffusion operations	$ 92,942[1]	$ 165,553	$ 168,300

This activity includes all funds needed to operate the gaseous diffusion plants excluding the cost of power which is budgeted separately. These include wages, employee benefits, supplies and expenses associated with plant operations; the cost of maintenance, upkeep, and repair of equipment, buildings, and facilities used in the production of enriched UF_6; the costs to perform technical and production services including plant engineering, laboratory studies, decontamination, handling of source and special materials and uranium control; utility services, including water, nitrogen, steam, and dry air; and a pro rata share of essential plant services such as security, health and safety, as well as janitorial, grounds maintenance, and general and administrative expenses.

The requested funding increase from FY 1983 to FY 1984 is due to escalation and the higher operating costs associated with the increased power level in FY 1984.

Process and long range technical support	$ 17,075	$ 18,000	$ 17,900

The process and long-range technical support activities assure the long-term operation of the gaseous diffusion plants at the improved and uprated capacity level. The FY 1984 budget request reflects the continuing consolidation of the program to the minimum levels required to adequately support the gaseous diffusion plants. The majority of the technical support effort during FY 1984 will be directed toward assuring the long-term reliability and performance of the existing plants at the improved and uprated capacity at minimum costs. The gaseous diffusion plants are now planned to continue to supply the major part of DOE's contracted separative work requirements well into the next decade. The primary activity will be technical efforts directed toward sustaining long-term plant productivity by minimizing operating problems, adapting to changing conditions (such as power reductions) and optimizing operations under changing conditions. In addition, the existing plants will be required to comply with all current and future environmental, health, safety, and other policy or regulation changes. The effective treatment of such problems will be a significant part of the technical support effort. Excluding escalation, the FY 1984 level represents a five percent reduction from the FY 1983 level.

Supporting services	$ 25,125	$ 26,500	$ 22,800

The supporting services activity is needed to assure the smooth and efficient operation of the gaseous diffusion plants. The requested funds will be used to maintain gaseous diffusion stages and associated facilities in standby; maintain feed conversion facilities in standby; fund interplant product flow and other shipments among the three gaseous diffusion sites, including the guarding in transit of classified material; fund warehousing of uranium in various forms at the gaseous diffusion sites; fund special management studies, including conceptual design work for major new line-item construction projects planned for future years; funds for engineering and planning studies to support capital improvements; and funds for international marketing activities, increased environmental, safety, and special study requests. Also included are funds for recovery of diffusion scrap.

The funding level for FY 1984 is $3,700,000 below the FY 1983 level. This decrease primarily reflects a decrease in the request for engineering and planning studies.

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[1] Assumes usage of $61,258,000 in addition to the budget request for a total diffusion operations budget of $154,200,000. These funds were available from projects 74-1-g and 71-1-f (CIP/CUP) and from contractor prefinancing.

Change in inventories .... $ -1,324 $ 3,900 $ 2,100

This activity includes funding for Common-Use Stores and Special Process Spares inventories. Both these activities were funded under the Uranium Enrichment Appropriation in FY 1983. Common-Use Stores inventories were funded under the Departmental Administration Appropriation in FY 1982.

The FY 1984 funding level is primarily for Common-Use Stores. The stores inventory includes miscellaneous spare parts and supplies for general cascade maintenance, various utilities systems and equipment, power distribution maintenance, various process electrical and automated systems, and for diffusion support activities. The stores inventory also includes raw material such as coal, diesel fuel, and various chemicals.

Cost of UESA services .... $ 0[1] $ 0[1] $ 5,300

These costs are incurred at the Oak Ridge and Portsmouth plants for withdrawal and analysis of product shipped under commercial toll enriching service contracts, and product shipped to other Federal Agencies. These costs are matched by miscellaneous revenues received from the customers for these services. Changes in product shipment estimates will increase or decrease this estimate accordingly. This activity was included in the Departmental Administration appropriation in FY 1982 and FY 1983.

Gaseous diffusion operations and support - capital equipment .... $ 23,600 $ 21,600 $ 9,900

These funds are needed to replace equipment which has exceeded its useful life and to purchase additional equipment needed to meet program objectives in a more effective and efficient manner.

The funds requested for FY 1984 are $11,700,000 lower than in FY 1983. In part this reflects a reduction in the replacement of obsolete equipment that exceeded its service life in past years, and an effort to limit replacements and additions to critical items. The FY 1984 funds will be used to replace only critical items of equipment that need immediate replacement and to provide for only the essential additions. One major item of automatic data processing (ADP) equipment is requested for FY 1984; a Computer-Aided Design (CAD) system, estimated to cost $538,000.

Gaseous diffusion operations and support - construction .... $ 69,650 $ 80,800 $ 71,000

Project 84-N-401, General plant projects, various locations (TEC $13,300) 0 0 13,300

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings, and utility systems at the three gaseous diffusion plants. General plant projects (GPP) are necessary to meet continuing requirements to maintain the facilities in a good state or repair, to adapt the facilities to new or improved production techniques, to effect economics of operation and to reduce or eliminate health, safety, environment, and security problems.

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[1] Excludes comparability number from the Departmental Administration Appropriation.

Project 84-N-402, UF_6 cylinders, gaseous diffusion plants (TEC $4,000)	0	0	4,000

This is the annual project to provide UF_6 cylinders for the Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio gaseous diffusion plants necessary to accommodate the storage and handling of UF_6 material as dictated by the cascade complex operating plans for FY 1985.

Project 84-N-403, Intermediate gas removal, Paducah, Kentucky gaseous diffusion plant (TEC $4,700)	0	0	1,700

This project provides a system to remove fluoride compounds from the purge cascade. Instrumentation will be installed to monitor gas concentration in the purge cascade to reduce the danger of attaining an explosive mixture and to avoid the problems associated with maintaining gas concentrations by operational administrative controls which restrict plant operations.

Project 84-N-404, Power system protection improvements, gaseous diffusion plants (TEC $16,000)	0	0	3,000

This project will provide for additions and modifications to the electrical systems at the three gaseous diffusion plants to improve the functional capabilities of the protective devices and systems. The work consists of replacing, reconnecting, or adding relays, fuses, disconnects, and wiring to improve protection of the high voltage electrical systems which supply the process buildings and auxiliary systems at the three plants.

Project 84-N-405, Utilities upgrading, Phase III, gaseous diffusion plants (TEC $42,000)	0	0	6,000

This project will upgrade certain utility and auxiliary systems at the three gaseous diffusion plants as defined by recent reliability studies. These upgrades will provide the operational reliability required for these vital support systems to sustain normal, safe and efficient cascade operations. The systems to be upgraded include a cooling tower replacement at Oak Ridge, Tennessee; structure and system work on cooling towers at Paducah, Kentucky; and electrical systems at Paducah, Kentucky and Portsmouth, Ohio.

Project 83-N-401, Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio (TEC $14,000)	0	7,000[1]	7,000

This project will replace the present oil filled circuit breakers at the Portsmouth gaseous diffusion plant with new gas filled circuit breakers. The new gas circuit breakers will be of increased interrupting capacity to protect the plant electrical circuits from the expected load growth on the Portsmouth region's external power grid. The project will also provide facilities for charging and maintaining the new circuit breakers.

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[1] It is uncertain whether this project will be approved for initiation under the FY 1983 Continuing Resolution.

Project 83-N-402, Compliance with toxic substances control act, gaseous diffusion plants (TEC $30,000) .... 0 6,000[1] 10,000

This project provides facilities for handling, storage, transportation, and disposal of polychlorinated biphenyl (PCB) materials. This is the only substance for which standards have been established by the Environmental Protection Agency to comply with the Toxic Substances Control Act (TSCA). TSCA stipulates that all PCB wastes stored before January 1, 1983 must be disposed of by January 1, 1984. After that time, PCB contaminated wastes may be stored for a period not to exceed one year.

Project 83-N-405, Utilities upgrading, Phase II, gaseous diffusion plants (TEC $25,000) .... 0 8,000[1] 10,000

This project will upgrade certain utility systems at the three gaseous diffusion plants to provide the operational reliability required for these vital support systems to sustain normal, safe and efficient cascade operations. The systems to be upgraded include steam, sanitary water, and certain electrical systems at Oak Ridge, Tennessee; selected electrical systems at Paducah, Kentucky; and selected air compressors and electrical systems at Portsmouth, Ohio.

Project 82-R-413, Improved UF_6 containment, gaseous diffusion plants (TEC $39,000) 7,100 20,900 9,000

This project provides improved containment facilities for various existing processes involving handling and transfer of either liquid or high pressure gaseous UF_6. Necessary modifications will be made to the original liquefaction systems for product and tails withdrawals and the existing transfer and new sampling facilities. Non-containment heating vessels for feed vaporization will be replaced with newly designed and improved containment autoclaves, and all existing high pressure autoclaves will be equipped with safety systems as dictated by ongoing safety analysis studies.

Project 82-R-416, Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant (TEC $ 5,500) .... 0 5,000[1] 3,500[2]

This project provides facilities at the Portsmouth, Ohio, gaseous diffusion plant to comply with existing State and Federal regulations pertaining to current environmental standards. This project is concerned with discharges of pollutants to nearby streams and pretreatment and disposal of solid wastes. This project is specifically concerned with effluents from laboratories and electrolytic cell cleaning activities, the treatment and disposal of solids generated by these new treatment facilities and interim storage for hazardous and toxic chemicals. This is the second in a series of projects designed to provide facilities to maintain compliance with standards established under the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977 and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976. Constrained funding in FY 1982 and FY 1983 will affect the construction completion schedule to the extent that the gaseous diffusion plants may be unable to comply with scheduled Federal and State statutes for pollution control. DOE may then be subject to fines and enforcement actions.

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[1] It is uncertain whether this project will be approved for initiation under the FY 1983 Continuing Resolution.

[2] The Department's FY 1984 funding request assumes no funding is received in FY 1983. If funding is approved in FY 1983, the FY 1984 request can be reduced.

Project 81-R-506, Environmental protection and safety improvements, Phase I, gaseous diffusion plants (TEC $33,000)	0	4,950[1]	3,500[2]

This project provides facilities at the gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, to further reduce the discharge of pollutants to nearby streams and to pretreat and dispose of the solid wastes generated at each site. This project is specifically concerned with hazardous wastes such as uranium and transuranics, sludge collection of toxic chemicals by fixation/treatment facilities and landfills. These facilities are required to comply with the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977 and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976. As a result of constrained FY 1981 and FY 1982 funding levels DOE may be unable to meet all 1984 Federal pollution control requirements on a schedule acceptable to EPA and State regulatory agencies. DOE, therefore, could be subject to fines and enforcement actions.

Prior year projects	$ 62,550[3]	$ 28,950[3]	$ 0
Gas centrifuge operations and support	$ 675,216	$ 682,500	$ 681,800

The funds requested for gas centrifuge operations and support include all of the program costs necessary for the support and construction of the Portsmouth Gas Centrifuge Enrichment Plant (GCEP). These funds are necessary to assure construction and operation of the Portsmouth plant on schedule. The largest single item within this program is $572,000,000 for the construction of the Portsmouth plant itself.

The need for GCEP is based on the results of the Department's thorough analyses of the alternatives available to the enrichment enterprise. These analyses carefully examine various production scenarios and evaluate the merits of each on the basis of cost, both to the Government and to the customer; impact on U.S. enrichment prices and our competitive position in the international market; energy efficiency; and technical achievability. In all cases, continued construction of GCEP yields superior benefits both to the Government and its customers in terms of improved economics and production reliability.

The justification for GCEP can be summarized quite simply: without GCEP, the United States will price itself out of the enrichment business. Even at reduced demand levels, the cost of production from GCEP in current year dollars will be significantly lower than production from the existing electricity intensive gaseous diffusion plants (GDPs). When escalation is factored in, the difference between GCEP and GDPs becomes very large. The rapid deployment of enrichment technologies capable of reducing U.S. production costs is a necessary and prudent business decision. Centrifuge technology is the most advanced proven enrichment technology in the world and offers the U.S. the opportunity to halt the erosion in its existing enrichment contract base and to regain its leadership and market share in the international nuclear community. The Advanced Isotope Separation (AIS) technology offers the promise of even lower future costs but must reach a much higher stage of development before it can be counted on for production planning.

1/ It is uncertain whether this project will be approved for initiation under the FY 1983 Continuing Resolution.

2/ The Department's FY 1984 funding request assumes no funding is received in FY 1983.

3/ Reflects comparability adjustment of $350,000 for general plant project funds for the Technical Information Center.

Gas centrifuge operations and support - operating expenses			
Gas centrifuge process development and demonstration	$ 76,000	$ 73,400	$ 71,900
Supporting services	5,200	12,800	34,500
Subtotal, operating expenses	$ 81,200	$ 86,200	$ 106,400

Gas centrifuge process development and demonstration	76,000	73,400	71,900

The goals of the gas centrifuge process development and demonstration program are to demonstrate the gas centrifuge technology required for GCEP, and to improve the efficiency of this technology for incorporation in the long-term operation of the GCEP. The major portion of the FY 1984 funding is devoted to the advanced gas centrifuge program, including procurement of the initial group of the Set IV centrifuges for reliability testing in the Advanced Centrifuge Test Facility, which will begin operation during FY 1985. Operation of test facilities will continue thru FY 1984, with primary emphasis on completion of reliability testing of the baseline (Set III) GCEP centrifuge.

The requested funding provides for the continuation of basic development tasks; continued operation of existing test facilities to obtain quantitative data on reliability and performance of the baseline centrifuge (both singly and in cascade mode of operation); continuation of construction of the Adanced Centrifuge Test Facility, which will test and verify the reliability of the Set IV centrifuge; and development of materials and processes for improving centrifuge separative performance. Emphasis in the development effort will be predominately on improvements in centrifuge performance achieved through the advanced gas centrifuge program. The improved centrifuge designs that result from this effort will be used as replacement centrifuges in the first two process buildings of GCEP and for initial installation in later process buildings of GCEP.

The initial design used in the advanced gas centrifuge program is designated as Set IV. Further performance improvements will result from subsequent centrifuge designs. Set IV centrifuges are intended to improve separative capacity by fifty percent relative to the baseline (Set III) in 1985, and will be qualified for production in 1988.

Set V gas centrifuges are expected to provide a factor of 2 to 3 times increase in separative performance relative to the Set III baseline. This significant improvement is expected to result from a combination of improved construction materials and design concepts. An expanded materials assessment began in early 1983, devoted to the study of fabrication techniques for small- and full-scale gas centrifuge rotors. Selected rotors will be tested full-scale by the end of FY 1984. This will permit assessment of the merit of proceeding further toward reliability testing of demonstration gas centrifuges.

Task categories covering the major aspects of the development program have been defined to reflect current program objectives. Detailed information on the major activities within these categories is as follows:

Basic studies

Improvements in gas centrifuge separative capacity result primarily from the understanding of fundamental phenomena. Basic studies provide the knowledge of centrifuge physics necessary to improve centrifuge performance. The FY 1984 basic studies work areas are a continuation of the scientific expertise and experimental facilities used in prior budget years. A major thrust of this program is the theoretical modeling and experimental investigation of stability and the improvement of flow efficiency. As new concepts are introduced at the theoretical level, basic experiments are performed to verify theories that have been developed and embodied in computer models. Such models will in turn permit more precise simulation of operating phenomena within the centrifuge. The gas centrifuge theory consultants group will continue periodic assessments of the state-of-the-art and assure continued feedback to all program participants.

Materials Development

The ability of construction materials to withstand operating stresses and chemical attack by process gas directly affects the performance and long-term durability of centrifuge components, especially the rotor. On-going evaluation of materials compatibility with uranium hexafluoride will continue in FY 1984. Any new materials identified as candidates for use in centrifuges will also be evaluated for UF_6 compatibility. Also to be continued will be the characterization of rotor material stress life and creep under operating conditions. Samples tested in this program are consistent with the current manufacturing processes.

The bulk of the materials effort will be directed at the major Set IV materials requirements for scoops, tubes, end caps, etc. In FY 1984, tube material will be qualified for Set IV, end caps will be finalized, and the characterization of improved rotor components will be completed. The modest effort on advanced materials for use in higher performance centrifuges was expanded early in FY 1983. Tasks will focus on rotor materials evaluation, end cap materials, scoop evaluation and bearing assessments. The advanced gas centrifuge resulting from these improvements has been designated Set V.

Development Facility Operations

Test facilities will be used to obtain additional operating experience and data for the baseline GCEP centrifuge, and for completion of the evaluation of reliability of the baseline centrifuge. Prototype Set IV centrifuges will be operated in development facilities to assess overall performance and obtain preliminary operating experience in support of the reliability testing that will be initiated in FY 1985.

The major test facilities to be operated in FY 1984 include: (1) the Advanced Equipment Test Facility, for reliability testing of the GCEP baseline centrifuges; (2) the Centrifuge Plant Demonstration Facility, a full unit cascade equivalent to the GCEP cascade, intended to demonstrate the operating characteristics of the baseline centrifuge system; (3) the Component Preparation Laboratories, for assembly operations and screening tests of centrifuges produced; (4) the Advanced Machine Development Laboratory, for characterization of prototype centrifuges and for mapping of machine operating parameters to establish limits; and (5) the Technology Test Facility, for support of the development of advanced centrifuge designs.

Advanced Machine Development

During FY 1984, the Set IV centrifuge will be undergoing prototype testing and design finalization for deployment in the Advanced Centrifuge Test Facility (ACTF). Several prototype units will be operating in development facilities. These units will serve as reference machines with which screening units in the Technology Test Facility and the early ACTF centrifuges can be compared. At the subassembly level, testing will continue to verify and characterize the subassembly designs (principally at the centrifuge manufacturers) and to optimize, or fine tune, the subassemblies to provide optimum performance of the prototype and ACTF units. Component development will also continue to improve the cost effectiveness on a subassembly basis and to provide alternatives to the selected concepts.

Supporting Services	5,200	12,800	34,500

Supporting services primarily include funds necessary for startup and operations of the GCEP. FY 1984 marks the start of installation of centrifuge in process building number one and the operation of the first production cascade on process gas. The budget increase reflects the increase in startup activities and operational testing of the six cascades in the first operational segment (train). The effort is designed to insure that the first operational segment of process building one becomes operational by FY 1985 and that the first process building is on-steam by FY 1988.

In FY 1984 staffing increases will occur in production, maintenance, and other technical areas. New staffing requirements will be funded in startup activities, especially training, and building operations support as the first operational segment of process building is placed on-stream. Total manpower for GCEP startup and operations will reach about 500 positions, which is greater than the FY 1983 level by about a factor of three. Funds are also provided for recycle centrifuge repair, building power and utilities, and operating maintenance materials. Recycle machines costs reflect the largest single material increase as machines are returned to the recycle and assembly building for "infant" or "operational" failure.

Gas centrifuge operations and support - capital equipment	$ 3,600	$ 3,800	$ 3,400

These funds provide additional and replacement equipment to support the gas centrifuge development and demonstration effort. Specialized instrumentation and devices are required to operate the facilities and laboratories that test and evaluate centrifuge performance. This equipment is required to analyze machine test conditions, collect and analyze data during testing, determine mechanical, chemical, and/or atomic properties, and provide for facilities operation.

Equipment items include diagnostic and process instrumentation, including an optic laser scanner, mass spectrometer, scanning electron microscope, etc. Also included is equipment for inspection and screening, handling, automatic data processing, and other items required for continued safe operations of facilities.

Gas centrifuge operations and support - construction	$ 590,416	$ 592,500	$ 572,000
Project 76-8-g, Enriched uranium production facilities, Portsmouth, Ohio (TEC $2,699,845)	588,000	588,000	572,000

This project provides 13.2 million SWU per year of enrichment capacity through construction of new gas centrifuge enrichment facilities which will consist of 8 process buildings, necessary auxiliaries, and other administrative, support, test, and service facilities as required.

Full operational capability of the first process building (1.1 million SWU) will be achieved in June 1988 and full operational capability of Process Building No. 2 (1.1 million SWU) will be achieved in October 1989 for a total of 2.2 million SWU. Additional production capacity will be added in 1.7 million SWU increments. For budget planning purposes, full production of 13.2 million SWU per year is projected for the mid-1990's.

The FY 1984 funding will provide for completion of design engineering and continuation of technical support, procurement, and construction initiated in prior fiscal years, and for new efforts initiated in FY 1984. These activities are keyed to milestones for completing and achieving full operational capability of: the "Early Train" in September 1985; process building No. 1 in June 1988; process building No. 2 in October 1989 and completion of the project in FY 1994. The procurement and construction activities to meet these milestones have been tailored in scope and schedule to satisfy the dual objectives of minimizing total project costs and yearend uncosted obligations. During FY 1984, design engineering will be completed for all plant facilities. Technical assistance by the operating contractors will continue to be funded to review procurements, inspect procured equipment, do prototype testing and prepare miscellaneous designs and studies. New fixed price contracts for procurement of process and process support equipment such as cranes and valves for Process Building Nos. 1 and 2; miscellaneous equipment for the Recycle/Assembly Building; procurement of equipment for the feed and withdrawal building, and other equipment for the plant support facilities will be made. New fixed price contracts for construction will be placed for the installation of special equipment in the Recycle/Assembly Building and centrifuge training and test facility, piping and equipment installation in the feed and withdrawal building, building of additional plant support facilities, miscellaneous minor structures and site improvements such as portals and parking lots.

Prior Year Projects	2,416	4,500	0
Advanced isotope separation	$ 85,237	$ 50,633	$ 73,000

The goal of the advanced isotope separation (AIS) program is to develop a technology which will provide for the production of enriched uranium at significantly reduced cost, thus enabling DOE to replace the power intensive diffusion plants, or supply additional separative work capacity as required for expansion of nuclear power.

Advanced isotope separation - operating expenses	$ 79,087	$ 47,233	$ 59,900

On April 30, 1982, the Department announced the selection of the Atomic Vapor Laser Isotope Separation (AVLIS) process as the process to enter the phase of engineering development. In addition, the Process Evaluation Board recommended that the Plasma Separation Process (PSP) be pursued for two years, subject to the availability of funding, as a backup to the AVLIS process. During FY 1983, research and development efforts on the uranium PSP process will be orderly phased out by changing detailed research and development priorities to support the Special Isotope Separation (SIS) program. FY 1984 funding, if required, will be provided by the SIS program.

The primary emphasis for FY 1983 is to determine the most economical design approach for the uranium collector subsystem. This will be accomplished by focusing available resources on the operation of existing testbeds to conduct and evaluate key experiments. The main goal is to develop a plant module point design, fully supported by experimental results, which will also serve as the reference design for the Development/Demonstration Module (DDM). Efforts on completing partially constructed testbeds, such as the Materials Handling Demonstration Module (MHDM), and initiation of a new separator will be delayed until FY 1984.

A significant increase in the technology development funds for the AVLIS program are required in FY 1984 to initiate the fabrication cycle for the second generation of laser systems and separator system to be completed prior to the detailed design freeze in FY 1987 for the DDM. These cycles normally require several years. In addition to the initiation of the new systems development, the Material Handling Development Module (MHDM) will begin operational tests at the end of FY 1984. This system will demonstrate large scale uranium material handling and thermal control operations of the collector subsystem.

The FY 1984 funding requested for this program is required to initiate evaluation of subsystem reliability, lifetime and engineering issues. These engineering development activities directly support the construction and operation of a Development/Demonstration Module (DDM) in the late 1980's. The DDM would be an integration of all systems presently envisioned for a production plant; hence, DDM operation would provide a firm basis for projecting production costs.

During FY 1984, an engineering readiness review of the DDM will be completed. The purpose of this review is to establish the firmness of the conventional building design. If the engineering uncertainty of directly installed process equipment can be accomodated within the proposed building, Title I design funds for the conventional facilities will be released by mid FY 1984. A more detailed review of the AVLIS DDM will be completed in the second half of FY 1984. This study will be used to verify the DDM design basis and to release detailed design funds for the DDM. These reviews are consistent with the recommendation of the AIS Process Evaluation Board.

Advanced isotope separation technology - capital equipment	$ 5,500	$ 2,500	$ 9,500

Equipment funds will be used to upgrade existing testbeds, to fabricate a near full scale MHDM for engineering evaluation of the uranium handling subsystem, and to begin fabrication of a full scale, full length, new separator system at Lawrence Livermore National Laboratory to be used in large scale, integrated enrichment experiments.

Examples of equipment needs are: power supplies and diagnostic and control hardware for the vaporizer, specialized collector extractor components, separator chambers and associated vacuum hardware, and electro-optical systems equipment.

Advanced isotope separation technology - construction	$ 650	$ 900	$ 3,600
Project 84-N-406, General plant projects, various locations (TEC $1,200)	650	900	1,200

General plant projects are required to provide needed laboratory space and building modifications for the AVLIS process.

Project 84-N-407, Development/Demonstration Module, Oak Ridge, Tennessee (Design Only) (TEC $2,400)	0	0	2,400

The purpose of the Development/Demonstration Module is to demonstrate the operation of an integrated production scale module of the Atomic Vapor Laser Isotope Separation (AVLIS) process which will establish the engineering, operational, and cost basis for AVLIS production facilities. This facility will provide a confirmation of process science and technology at full scale, the development and demonstration of plant-size components, and the integration of all of the process systems at plant scale. With this information, AVLIS investment and operating costs can be projected with confidence as a part of the United States enrichment planning process.

Program Direction[1/]	$ 3,493[2/]	$ 3,650[2/]	$ 3,900

Funding for this activity is required for the Headquarters and field personnel associated with the Uranium Enrichment program. Funds are included for 69 full-time equivalents, for management support in the Office of Uranium Enrichment and Assessment, and for certain enrichment related work at the Oak Ridge Operations Office. This funding request provides for personal services, personnel benefits, travel, and contractual services and supplies.

[1/] This includes funding for the Uranium Enrichment Activities and Advanced Isotope Separation personnel.

[2/] This includes comparability adjustments in the Uranium Enrichment Activities and Advanced Isotope Separation programs for NE overhead support.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Nuclear
Uranium Enrichment - Operating Expenses
Uranium Enrichment - Plant and Capital Equipment

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982[1] Appropriation	FY 1983[1] Appropriation	FY 1984[1] Base	FY 1984 Request
Uranium Enrichment Revenues (NE)				
Operating Expenses	$-1,116,672	$-1,265,869	$-1,265,869	$-1,570,600
Capital Equipment	-27,200	-27,900	-27,900	-22,800
Construction	-739,800	-674,550	-674,550	-646,600
Total	$-1,883,672[2]	$-1,968,319[3]	$-1,968,319[3]	$-2,240,000

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1983 Appropriation enacted	$-1,968,319
Built in increases and decreases:	
Pay cost supplemental	0
FY 1984 base	-1,968,319
Program increases and decreases:	
Operating Expenses	-304,731
Capital Equipment	+5,100
Construction	+27,950
FY 1984 budget request	$-2,240,000

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[1] The miscellaneous revenues of $25,200,000 in FY 1982 and $25,000,000 in FY 1983 are included for comparability purposes. These revenues are actually budgeted in the Departmental Administration appropriation. Beginning in FY 1984, miscellaneous revenues are budgeted in the Uranium Enrichment Appropriation.

[2] Includes comparability transfer of $136,800,000 for uranium enrichment services provided to the Defense Programs.

[3] Includes comparability transfer of $109,000,000 from Defense Programs for uranium enrichment services.

PROGRAM BUDGET JUSTIFICATION

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Request
Uranium enrichment revenues	$-1,883,672	$-1,968,319	$-2,240,000

The estimate for uranium enrichment revenues includes the sale of uranium enrichment services for use in nuclear power reactors for foreign and domestic customers. Also included in this activity are the sale of Government Enrichment services, advance payments received from customers, the sale of depleted uranium and miscellaneous revenues related to uranium enrichment activities as detailed below.

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Request
Sale of commercial uranium enrichment services	$-1,810,909	$-1,937,319	$-2,165,000
Sale of Government uranium enrichment services	-136,800[1]	-109,000[2]	-190,000
Advanced payments on long-term fixed commitment contracts	+107,034	+103,000	+142,000
Subtotal toll enriching revenues	-1,840,675	-1,943,319	-2,213,000
Sale of depleted uranium	-17,797	0	0
Miscellaneous revenues	-25,200[3]	-25,000[3]	-27,000
Total uranium enrichment revenues ..	$-1,883,672	$-1,968,319	$-2,240,000

Sale of uranium enrichment services	$-1,810,909	$-1,937,319	$-2,165,000

The FY 1984 estimate is based on the sale of 14.6 million commercial SWU which comprises approximately 8.5 million SWU sales to domestic customers and 6.1 million SWU to foreign customers. In each instance, the toll enrichment customer supplies feed to the agency in the form of uranium hexafluoride (UF_6) of normal assay and the agency processes the UF_6 in the gaseous diffusion plants to the level of enrichment in the U-235 the U-235 isotope specified by the customer. The estimate is based upon customer transactions tails assay of 0.2 percent and pricing is based on the recovery of all government costs. Additionally, 2.0 million SWU is sold to Government users at a value of $190,000,000. The $190,000,000 is being provided by Atomic Energy Defense Activities in the Department of Energy.

Advanced payments on long-term fixed commitment contracts	$ +107,034	$ +103,000	$ +142,000

The long-term fixed commitment contracts specified that all customers are required to make an advance payment to the agency. The advance payment is credited against future deliveries of toll enriching services. The estimate for FY 1984 reflects the applicable credits against FY 1984 sales of toll enriching services for advance payments made in prior years.

Sale of depleted uranium	$ +17,797	$ 0	$ 0

Included in the total uranium enrichment revenues are revenues from the sale of approximately 20,000 MTU of depleted uranium at $8.11 per kgU.

Miscellaneous revenues	$ -25,200[3]	$ -25,000[3]	$ -27,000

Miscellaneous revenues consist of packaging and handling charges, late payment charges, sales from deferred sales contracts, and related items.

1/ Comparability transfer for uranium enrichment services provided to the Defense Programs.

2/ Comparability transfer from Defense Programs for uranium enrichment services.

3/ The miscellaneous revenues of $25,200,000 in FY 1982 and $25,000,000 in FY 1983 are included for comparability purposes. These revenues are actually budgeted in the Departmental Administration appropriation. Beginning in FY 1984, miscellaneous revenues are budgeted in the Uranium Enrichment Appropriation.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
LEAD TABLE
Nuclear
Uranium Enrichment - Operating Expenses
Uranium Enrichment - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Uranium Resource Assessment (NE)				
Assessment Program:				
Operating Expenses	$ 5,500	$ 3,000	$ 3,000	$ 0
Capital Equipment	200	0	0	0
Construction	100	0	0	0
Subtotal	5,800	3,000	3,000	0
Program Direction:				
Operating Expenses	4,179[1]	2,000	2,000	0
Total:				
Operating Expenses	9,679	5,000	5,000	0
Capital Equipment	200	0	0	0
Construction	100	0	0	0
Uranium Resource Assessment	$ 9,979	$ 5,000	$ 5,000	$ 0
Staffing FTP/Total FTE's	47/50	0/0[2]	0/0[2]	0/0

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1983 Appropriation enacted	$ 5,000,000
Built in increases and decreases:	
Pay cost supplemental	0
FY 1984 base	$ 5,000,000
Program increases and decreases:	
Assessment Program	
o Program Terminated	-5,000,000
FY 1984 Budget Request	$ 0

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[1] Reflects comparability adjustment of $21,000.

[2] The FY 1983 manpower target reflects the Administrations plan to close this program out in FY 1983.

Uranium Resource Assessment .... $ 9,979 $ 5,000 $ 0

The Administration still plans to close this program out in FY 1983 since the major goals of this program have been achieved. The FY 1984 budget request is for $0 and 0 FTE's.

Assessment Program

Operating Expenses .... $ 5,500 $ 3,000 $ 0

The FY 1983 funds are sufficient to comply with the directives contained in the House and Senate Appropriation Committees reports on the FY 1983 budget. Specifically, funds will be used to complete analysis and archiving activities as well as other work necessary to publically release all of the data which has been gathered by the program on uranium resources.

Capital Equipment 200 0 0

No funds are provided for this activity.

Construction 100 0 0

No funds are provided for this activity.

Program Direction 4,179 2,000 0

No funds or FTE's are provided for this program. Available FY 1983 funds are being used to support the FY 1983 effort.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations

2. Project No. 84-N-401

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/82 $13,300

7. Financial Schedule:

		Costs			
Fiscal Year	Obligations[1]	FY 1982	FY 1983	FY 1984	After FY 1984
Prior year projects	$ XXXXX	$ 6,311	$ 5,000	$ 2,500	$ 0
FY 1982 projects	15,500	1,251	6,400	6,000	1,849
FY 1983 projects	18,000	0	2,800	5,500	9,700
FY 1984 projects	13,300	0	0	2,800	10,500

8. Brief Physical Description of Project:

Significant expenditures for general plant projects (GPP) to replace, upgrade and maintain facilities will continue in FY 1984. The age and condition of the plant and continuing concern for the protection of employees, the public and the environment continue to impact on the levels of GPP required. By nature, general plant projects are such that they are not always identifiable on a prospective basis and even where they are identifiable there is a wide band of uncertainty about the physical and financial scope.

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[1] This project also requires FY 1984 Authorizations and Appropriations of $13,300,000.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations 2. Project No. 84-N-401

8. Brief Physical Description of Project: (Continued)

This project provides for general plant project capital alterations and additions, such as building and utility systems required for ORO production programs. It includes the cost of installed equipment where such is an integral part of general plant projects.

The estimate provides for all general plant projects required for the following:

a. The gaseous diffusion plants and supporting facilities at Oak Ridge, Tennesee; Paducah, Kentucky; and Portsmouth, Ohio.

b. The Oak Ridge, Tennessee administrative projects, including the Federal Building, security facilities, and other direct requirements.

9. Purpose, Justification of Need for, and Scope of Project:

General plant projects (GPP) are necessary and continuing requirements to maintain facilities in a satisfactory state of repair, to adapt the facilities to new or improved production techniques, to effect economics of operations, and to reduce or eliminate health, fire, and security problems. Process development and changes in technical program requirements frequently result in the need for alterations or new construction items not previously anticipated. The total project estimate is made up of the anticipated level of work required by each participant. This level takes into account past experience, planned program changes and technological advances. Following are examples of GPP identified at this date which may be required in FY 1984.

Estimates by Location are as follows:

Oak Ridge Gaseous Diffusion Plant	$ 6;300
Paducah Gaseous Diffusion Plant	4,000
Portsmouth Gaseous Diffusion Plant	2,700
All Other Oak Ridge Operations	300
Total Uranium Enrichment Activities	$13,300

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations 2. Project No. 84-N-401

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Oak Ridge Gaseous Diffusion Plant		$6,300,000
K-31 Switchyard Recirculating Cooling Water Pipe Replacement	$ 500,000	

This project will provide for the installation of approximately 2,000 feet of fiberglass pipe and appropriate valves for the K-31 switchyard recirculating cooling water system. The steel underground lines currently utilized for supply and return cooling water to the K-31 switchyard synchronous condensers were installed in 1951 and have sustained extensive galvanometric corrosion due to the stray currents existing in this area. The corrosion of the piping system has progressed to the state that the only method of maintaining a reliable source of cooling water for the operation of the synchronous condensers is the complete replacement of the underground system.

If the proposed system is not installed, it will be necessary to continue excavation and repair of these lines as leaks develop, and to provide annual maintenance to clean fouled coolers, thus incurring the associated maintenance cost and operational problems. A major leak or rupture of the deteriorated lines could result in a major insult to the environment from the chromated RCW water and could require large load reductions resulting in loss of separative work of approximately $100,000 per day.

Sanitary Water Drainage, K-1401	$ 300,000

The present sanitary drain piping is over 30 years old and has become partially clogged to the extent that drainage backs up and overflows. Maintenance has been hard pressed to keep the drains open. The floor drains for the building are also part of this drainage system. Some of them have been closed off and abandoned. Much of the drain piping from water cooled machines is now piped on the surface due to inaccessible drains. New drainage outlets will be installed to provide a reliable drainage capacity and system.

If the present sanitary drains are not replaced, more maintenance time will be spent keeping drains open and a possible health hazard could develop. The condition has worsened in recent years and an acceleration of failures in the future could present untenable drainage problems.

1. Title and location of project: General plant projects, various locations 2. Project No. 84-N-401

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Oak Ridge Gaseous Diffusion Plant (continued)

Relocation of K-1004C Surface Finishing Laboratory.. $ 300,000

This project involves moving the Surface Finishing Laboratory from its present location in K-1004C to K-1006. The new laboratory space will be upgraded with new plumbing and electrical systems and acid resistant floors, hoods, cabinets, and splash shields for the walls. The tanks, pumps, and heat exchangers for electroless plating will be moved and reinstalled in the new lab.

The Surface Finishing Laboratory is a general purpose laboratory supporting the centrifuge, diffusion, Y-12 weapons, and advanced isotope separation programs. The present laboratory space is too small for the anticipated work load. Also, existing hoods and laboratory furniture are badly corroded and in need of replacement with more corrosion-resistant equipment. Replacement will be required whether or not the laboratory is moved to a larger area.

Paducah Gaseous Diffusion Plant... $4,000,000

Computerized Badging System.. $ 750,000

The present badging system will be upgrading by incorporating computer technology and the new Union Carbide personnel badge. A computer with necessary peripheral units will be installed in C-200 Guard and Fire Headquarters Command Center to control the system and provide data collection. Badge reader subsystems will be installed at key entry portals. Necessary interconnecting cabling, computer air conditioning, and power will be supplied. A minimal amount of software development will be required to adapt the Oak Ridge Gaseous Diffusion Plant programs to meet Paducah Gaseous Diffusion Plant's needs.

Implementing a computerized badging system will allow the Paducah Gaseous Diffusion Plant to have a personnel access system that is compatible with that of other Union Carbide plants. The system will speed throughput at entry portals during shift changes and provide a record of entries to the plant on a real-time basis.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations

2. Project No. 84-N-401

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Paducah Gaseous Diffusion Plant (continued)

Ventilation Controls in UF_6 Handling Areas .... $ 300,000

Areas in which liquid or high pressure gaseous UF_6 are handled outside the cascade are primarily in the feed, withdrawal, and sampling and transfer facilities. In the event of UF_6 releases in these facilities, evacuation of personnel may be necessary. This project will provide new control stations located outside of Buildings C-310, C-310-A, C-315, C-333-A, C-337-A, and C-360 to permit existing doors to be opened or closed and building ventilation equipment to be started or stopped as may be necessary after the building has been evacuated. Minor modifications will be made to the ventilation systems in C-333-A and C-337-A.

Plant Facilities Security Improvements .... $ 350,000

This project will include a camera surveillance system for the Paducah Gaseous Diffusion Plant perimeter fence, sequential controls on the perimeter fence lighting system, additions to the C-200 Guard and Fire Headquarters command center, and intrusion detection for the C-270 Maintenance Building seal cage and the C-409 Stabilization Building ADP system.

Portsmouth Gaseous Diffusion Plant $2,700,000

Shower and Locker Room Modifications .... $ 325,000

A three plant Radiation Standards and Practice Committee is working towards defining contamination control criteria. This project anticipates that some modification or renovation of existing shower and locker room facilities will be required as the result of contamination control procedures eventually adopted. The modification anticipated is incorporation of the hot/cold locker room concept in the uranium processing faclities, especially in areas where high assay materials are processed and breaching of the plant allowable limits is more apt to occur.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations   2. Project No. 84-N-401

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Portsmouth Gaseous Diffusion Plant (continued)

Fire Alarm System Upgrading .... $ 410,000

The proposed project will provide funds for the gradual upgrading of the Gaseous Diffusion Plant's fire alarm system. Current plans are to maintain a reliable system by the selective replacement of high maintenance items such as cell floor wiring, aerial and buried cabling and local ADT equipment power supplies as needed.

Radiation Instrument Calibration Facility .... $ 850,000

This project includes the modification of an existing, or construction of a new facility to be used exclusively for the repair and calibration of radiation instruments used at the Portsmouth site. The facility will be designed to meet all OSHA and ANSI Standard requirements. The facility will have sufficient floor space for the repair of these instruments as well as the storage and positioning of all radiation sources for the proper calibration of these instruments. In addition, the facility will be equipped with the required utilities and auxiliary services required to sustain a permanent work force.

All Other, Oak Ridge Operations .... $ 300,000

Miscellaneous other projects are mainly for improvements to the Security Division, Patrol Range, motor pool and security operations center.

10. Details of Cost Estimate:

Cost estimate details have not been developed. Such detailed estimates are made in connection with each individual project request after specific need and scope have been established and after completion of preliminary engineering.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: General plant projects, various locations   2. Project No. 84-N-401

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11. Method of Performance:

To the extent practicable, work will be done by lump-sum contracts awarded to the lowest bidder.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

No narrative required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: UF_6 cylinders, gaseous diffusion plants

2. Project No. 84-N-402

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 4th Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/82 $ 4,000 1/

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 4,000	$ 4,000	$ 4,000	$1,700
1985	0	0	0	2,300

8. Brief Physical Description of Project:

This project provides new cylinders at the three gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, to accommodate the storage and handling of UF_6 material as dictated by the cascade complex operating plans for FY 1985.

1/ This is an annual project to provide UF_6 cylinders for the three gaseous diffusion plants. These annual projects will be submitted for authorization and appropriation on a continuous basis consistent with Uranium Enrichment operations.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: UF_6 cylinders, gaseous diffusion plants 2. Project No. 84-N-402

9. Purpose, Justification of Need for, and Scope of Project:

UF_6 feed and tails rates are a direct result of gaseous diffusion plant throughput dictated by the level of customer requirements for uranium enrichment services. Because of the direct relationship to production, the tails must be removed and stored in cylinders for continued plant operation. This means the number of cylinders required for handling of feed and the removal of the tails is a function of production.

Cylinders required for production during FY 1985 will be provided with this project. Storage yards for these cylinders will be available from a prior year project.

Delay in procurement of cylinders would force a reduction or curtailment of gaseous diffusion plant operations.

No significant increase in operating costs will result from implementation of this project.

10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total Cost
a. Engineering, design and inspection at approximately 3% of construction costs, Item b	$ 30	$ 50	$ 30	$ 110
b. Construction costs	900	1,490	900	3,290
(1) Special facilities	900	1,490	900	3,290
c. Standard equipment	0	0	0	0
Subtotal	930	1,540	930	3,400
d. Contingency at approximately 18% of above costs	170	260	170	600
Total estimated costs	$ 1,100	$ 1,800	$ 1,100	$ 4,000[b]

11. Method of Performance:

Titles I, II and III engineering will be accomplished by the respective operating contractor. To the extent feasible, procurement will be accomplished by fixed-price subcontract(s) awarded on the basis of competitive bidding. An operating contractor will procure cylinders for all three sites.

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[a] The cost estimate is based on previous experience with the procurement of cylinders.

[b] All costs have been escalated at the rate of 10% to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: UF$_6$ cylinders, gaseous diffusion plants — 2. Project No. 84-N-402

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	Total
a. Total project costs				
1. Total facility costs				
(a) Construction line item	$ 0	$ 1,700	$ 2,300	$4,000
(b) PE&D	0	0	0	0
(c) Expense funded equipment	0	0	0	0
(d) Inventories	0	0	0	0
Total facility costs	0	1,700	2,300	4,000
2. Other project costs				
(a) R&D necessary to complete construction	0	0	0	0
(b) Conceptual design costs	0	0	0	0
(c) Other project related costs	0	0	0	0
Total other project costs	0	0	0	0
Total project costs	$ 0	$ 1,700	$ 2,300	$4,000

b. Other related annual costs (estimated life of cylinders: 30 years)	
1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility..	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

No narrative required.

Department of Energy
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CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

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1. Title and location of project: Intermediate gas removal, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 84-N-403

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3. Date A-E work initiated: 1st Qtr. FY 1984

5. Previous cost estimate:
Date: $ None

3a. Date physical construction starts: 1st Qtr. FY 1985

6. Current cost estimate:
Date: 12/82 $ 4,700

4. Date construction ends: 4th Qtr. FY 1987

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 1,700	$ 1,700	$ 1,700	$ 400
1985	3,000	3,000	3,000	600
1986	0	0	0	2,600
1987	0	0	0	1,100

8. Brief Physical Description of Project:

This project provides a system for removal of various fluoride compounds from the purge cascade. Chemical traps using $CaCO_3$ as the bed material will be used in this system. Instrumentation to monitor fluctuating gas concentration in purge cascade cells resulting from cell treatment activity will be installed to optimize the removal process. Controls and other process monitoring instrumentation will be installed in the existing area control room.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Intermediate gas removal, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 84-N-403

9. Purpose, Justification of Need for, and Scope of Project:

This project provides for installation of a system to remove intermediate molecular weight gases, from the purge cascade. Intermediate gases collect between the UF_6 product withdrawal point and the high-speed cells and pose a possible explosive hazard if concentrations are not maintained within required limits. Traditionally, these gases have been removed with the product stream, the rate being dependent upon the plant power level and/or the product assay. Any changes in these variables which lower the product withdrawal rates, will cause the concentration of the intermediate gases to increase in the operating equipment. When this arises, additional administrative controls must be exercised to maintain the intermediate gas concentration within the required limits. In order for an explosive hazard to exist, there must be an ignition source, and the minimum concentration of both an oxidant and a reductant must be exceeded. The system to be installed in the project will effectively maintain the oxidant concentration due to cell treatment activities below this minimum in the purge cascade cells.

The FY 1984 obligational authority of $1,700,000 requested herein will provide for Titles I and II engineering and initiation of equipment procurement.

Deletion or deferral of this project will result in continued limitations to plant operations.

10. Details of Cost Estimate:[a]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 20% of construction costs, Item b.		$ 650
b. Construction costs		3,300
(1) Special Facilities	$3,300	
Subtotal		3,950
c. Contingency at approximately 19% of above costs		750
Total estimated costs		$ 4,700[b]

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[a] The above estimates are based on completed conceptual design cost estimates.

[b] All costs have been escalated at the rate of 10 percent to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Intermediate gas removal, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 84-N-403

11. Method of Performance:

Design and inspection will be performed by the Operating Contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item	$ 0	$ 400	$ 600	$ 2,600	$ 1,100	$ 4,700
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	400	600	2,600	1,100	4,700
2. Other project costs						
(a) R&D necessary to complete construction.	0	0	0	0	0	0
(b) Conceptual design costs	70	0	0	0	0	70
(c) Other project related costs	0	0	0	0	0	0
Total other project costs	70	0	0	0	0	70
Total project costs	$ 70	$ 400	$ 600	$ 2,600	$ 1,100	$ 4,770

b. Other related annual costs (estimated life of project facilities: 20 years)

1. Facility operating costs	$ 30
2. Programmatic operating expense directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 30

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Operating costs are estimated at $30,000 per year for utilities, maintenance, labor and worked materials.

Department of Energy
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CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Power system protection improvements, gaseous diffusion plants

2. Project No. 84-N-404

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/82 $ 16,000

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 3,000	$ 3,000	$ 3,000	$ 1,000
1985	13,000	13,000	13,000	4,100
1986	0	0	0	4,150
1987	0	0	0	4,150
1988	0	0	0	2,600

8. Brief Physical Description of Project:

This project will provide for additions and modifications to selected electrical systems supplying the process buildings and auxiliary systems at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, to improve the functional capabilities of the protective devices and systems. The work consists of adding new relays, replacing or reconnecting existing relays, adding fuses, adding or replacing disconnects with new disconnects or fused disconnects, and adding or replacing interconnecting signal and trip wiring.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Power system protection improvements, gaseous diffusion plants

2. Project No. 84-N-404

9. Purpose, Justification of Need for, and Scope of Project:

Studies by consultants at the three gaseous diffusion plants have identified deficiencies which have developed in the power system protective devices over the past several years. This project is required to permit safe operation of the electrical systems at the three sites during both normal and emergency conditions without jeopardizing personnel or causing excessive system damage.

Where practical, existing equipment will be reused by modifying, reconnecting and/or rewiring. In some instances, new relays, new current transformers and new interconnecting wiring, etc., will be required. New fuses and/or fused disconnect switches will be installed in selected locations.

The FY 1984 obligational authority of $3,000,000, requested herein, will provide for Title I and Title II engineering and initiation of long-lead procurement items.

It is anticipated that the annual maintenance costs will be reduced due to less extensive equipment damage under electrical fault conditions and hazards to personnel will be reduced during operation and maintenance.

A delay in the implementation of this project will increase the risk of personnel injury and cause longer operational interruptions due to more extensive equipment damage.

10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total
a. Engineering, design and inspection at approximately 20.5% of construction costs, Item b.	$ 700	$ 600	$ 1,000	$ 2,300
b. Construction costs	3,200	2,700	5,300	11,200
(1) Special Facilities	600	1,180	0	1,780
(2) Utilities	2,600	1,520	5,300	9,420
Subtotal	3,900	3,300	6,300	13,500
c. Contingency at approximately 18.5% of above costs	700	700	1,100	2,500
Total estimated costs	$ 4,600	$ 4,000	$ 7,400	$ 16,000[b]

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[a] Cost estimate based on completed conceptual design.

[b] All costs have been escalated at the rate of 10% to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Power system protection improvements, gaseous diffusion plants

2. Project No. 84-N-404

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontract(s) awarded on the basis of competitive bidding. Long delivery and special procurements will be accomplished by the operating contractors as will tie-ins and work on operating equipment.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$1,000	$ 4,100	$ 4,150	$ 4,150	$ 2,600	$16,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	1,000	4,100	4,150	4,150	2,600	16,000
2. Other project costs							
(a) R&D necessary to complete construction	0	0	0	0	0	0	0
(b) Conceptual design costs	520	0	0	0	0	0	520
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	520	0	0	0	0	0	520
Total project costs	$ 520	$1,000	$ 4,100	$ 4,150	$ 4,150	$ 2,600	$16,520

b. Other related annual costs (estimated life of project components: 30 years)

1. Facility operating costs	$ 0
2. Programmatic operating expense directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility.	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

No narrative required.

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CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase III, gaseous diffusion plants

2. Project No. 84-N-405

3. Date A-E work initiated: 1st Qtr. FY 1984

5. Previous cost estimate:
Date: $ None

3a. Date physical construction starts: 4th Qtr. FY 1984

6. Current cost estimate:
Date: 12/82 $ 42,000

4. Date construction ends: 4th Qtr. FY 1988

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 6,000	$ 6,000	$ 6,000	$ 3,000
1985	36,000	36,000	36,000	13,800
1986	0	0	0	14,300
1987	0	0	0	8,900
1988	0	0	0	2,000

8. Brief Physical Description of Project:

This project provides for upgrading selected utility and auxiliary systems at the gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, as defined by recent reliability studies. This work will encompass; at Oak Ridge, the replacement of the K-892G Cooling Tower; at Paducah, the restoration and replacement of selected structure, piping, fill and cable on a variety of cooling towers and replacement of the 480 volt fan switchgear in all four pumphouses; and, at Portsmouth, the replacement of 480 volt process auxiliary substation breakers in the X-326 and X-330 Process Buildings.

1. Title and location of project: Utilities upgrading, Phase III, gaseous diffusion plants

2. Project No. 84-N-405

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to renovate, upgrade or replace utility systems or components vital to the continued reliable operation of the diffusion cascade and support buildings. Equipment that has become worn out, obsolete, and unreliable is to be upgraded as necessary to improve the safety, reliability and efficiency of plant operations for the long-term future.

The cooling tower at Oak Ridge has exceeded its expected life and its structural integrity has deteriorated such that a collapse of the tower or some part thereof could occur during unusual weather or under abnormal operating circumstances. The normal design safety margins have essentially disappeared and the structure cannot be expected to withstand high wind, heavy ice or large vibrational loads. The loss of this tower would force the shutdown or major curtailment of production in the K-33 Process Building.

Components of the cooling towers at Paducah have similarly exceeded their life and have deteriorated with usage. The structures are still in serviceable condition, but the fill material in some of the towers (the section where the heat transfer occurs) is disintegrating. The upper decks are also deteriorating and becoming hazardous. The water distribution systems on top of the towers have extensive internal corrosion and scaling of the piping and deterioration of the wood that degrades the water distribution and cooling efficiency of the entire tower. These components must be replaced. The conduit and cable serving the cooling tower fans has deteriorated beyond repair and must be replaced in order to withstand the severe environmental conditions.

The electrical switchgear serving the critical auxiliary equipment in the process buildings at Portsmouth and the cooling tower fans on all of the cooling towers at Paducah have deteriorated with age and usage. The manufacturers of this equipment have either ceased manufacturing these components or have gone out of business entirely and replacement parts are very difficult to obtain. Parts must be custom made or substitutions found. It is now necessary to renovate this switchgear on a programmed basis in order to restore the necessary reliability for continued operation and personnel safety.

The FY 1984 obligational authority of $6,000,000, requested herein, will provide for initiation of the Title I and Title II engineering, procurement of some long lead time equipment, and initiation of some construction activities.

A delay in the implementation of the project will result in continued deterioration of these critical systems and increase the risk, perhaps significantly, of serious operational interruptions to the cascades.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: Utilities upgrading, Phase III, gaseous diffusion plants

2. Project No. 84-N-405

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10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total
a. Engineering, design and inspection at approximately 12% of construction costs, Item b.	$ 2,000	$ 1,400	$ 450	$ 3,850
b. Construction costs	10,900	13,325	8,450	32,675
(1) Other structures	10,900	13,325	0	24,225
(2) Special facilities	0	0	8,450	8,450
Subtotal	12,900	14,725	8,900	36,525
c. Contingency at approximately 15% of above costs	1,900	2,225	1,350	5,475
Total estimated costs	$ 14,800	$16,950	$ 10,250	$ 42,000[b]

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract except that some switch-gear replacements will be done by the operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontracts(s) awarded on the basis of competitive bidding. Long delivery and special procurements will be accomplished by the operating contractors as will tie-ins and work on operating equipment.

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[a] Cost estimate based on completed conceptual design.

[b] All costs have been escalated at the rate of 10% to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase III, gaseous diffusion plants

2. Project No. 84-N-405

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item..................	$ 0	$3,000	$13,800	$14,300	$ 8,900	$ 2,000	$42,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	3,000	13,800	14,300	8,900	2,000	42,000
2. Other project costs							
(a) R&D necessary to complete construction.	0	0	0	0	0	0	0
(b) Conceptual design costs	351	0	0	0	0	0	351
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	351	0	0	0	0	0	351
Total project costs	$ 351	$3,000	$13,800	$14,300	$ 8,900	$ 2,000	$42,351

b. Other related annual costs (estimated life of project facilities: 15 years)

1. Facility operating costs	$ 0
2. Programmatic operating expense directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. No narrative required.
   2. No narrative required.
b. Other related annual costs
   1. Facility operating costs are expected to be reduced due to decreased maintenance. No additional operating personnel will be required.
   2 thru 5. No narrative required.

Department of Energy
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CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Location to be determined

1. Title and location of project: General plant projects, various locations

2. Project No. 84-N-406

3. Date A-E work initiated: 1st Qtr. FY 1984

5. Previous cost estimate:
Date: $ None

3a. Date physical construction starts: 3rd Qtr. FY 1984

6. Current cost estimate:
Date: 12/82 $ 1,200

4. Date construction ends: 2nd Qtr. FY 1985

7. Financial Schedule:

		Costs			
Fiscal Year	Obligations[1]	FY 1982	FY 1983	FY 1984	After FY 1984
Prior year projects	$ 0	$ 1,290	$ 100	$ 0	$ 0
FY 1982 projects	650	520	130	0	0
FY 1983 projects	900	0	120	780	0
FY 1984 projects	1,200	0	0	820	380

8. Brief Physical Description of Project:

This project will provide needed laboratory space and minor building modification for the Atomic Vapor Laser Isotope Separation (AVLIS) process.

[1] This project also requires FY 1984 Authorizations and Appropriations of $1,200,000.

CONSTRUCTION PROJECT DATA SHEETS

Location to be determined

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1. Title and location of project: General plant projects, various locations   2. Project No. 84-N-406

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9. Purpose, Justification of Need for, and Scope of Project:

General Plant Projects (GPP) .... $ 1,200

San Francisco, Lawrence Livermore National Laboratory .... $ 400

The GPP funds requested are needed for certain capital improvements, modification, and upgrading of the various facilities such as expanding electrical substations and heat removal systems for laser power upgrades and to provide utility support for an expanded uranium vaporizer system.

Oak Ridge, Oak Ridge Gaseous Diffusion Plant .... $ 800

Several projects will upgrade the support services required for the expansion of the Materials Handling Demonstration Module (MHDM).

Separator Refurbishment Facility .... $ 400

The ventilation and utility system servicing the Separator Refurbishment area, which is located in the Advanced Isotope Separation Laboratory, K-1037, will be upgraded to permit the installation of existing and new equipment which is required in the refurbishment cycle of separator module components.

Utilities for MHDM II .... $ 400

Systems will be installed to provide the additional cooling water capacity, electrical power, and other utilities required to operate the two-meter (MHDM II) separator.

10. Details of Cost Estimate:

Cost estimates for GPP are normally included in the request for a construction directive after the need for work has been established, the scope of the work determined, and the preliminary engineering completed. These estimates are based on general experience for GPP projects of this type.

CONSTRUCTION PROJECT DATA SHEETS

Location to be determined

1. Title and location of project: General plant projects, various locations 2. Project No. 84-N-406

11. Method of Performance:

Design will be on the basis of negotiated architect-engineer contracts. To the extent possible, construction and procurement will be by fixed price contracts and subcontracts on the basis of competitive bid.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not applicable.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not applicable.

Department of Energy
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CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Development/Demonstration Module, Oak Ridge, Tennessee (Design Only)

2. Project No. 84-N-407

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2rd Qtr. FY 1985

4. Date construction ends: 3rd Qtr. FY 1989

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/82 $ 2,400[1/]

7. **Financial Schedule**:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 2,400	$ 2,400	$ 2,400	$ 2,000
1985	TBD	TBD	TBD	400
1986	TBD	TBD	TBD	TBD
1987	TBD	TBD	TBD	TBD
1988	TBD	TBD	TBD	TBD

8. **Brief Physical Description of Project**:

The purpose of the Development/Demonstration Module (DDM) is to demonstrate the operation of an integrated production scale module of the Atomic Vapor Laser Isotope Separation (AVLIS) process which will establish the engineering, operational, and cost basis for AVLIS production facilities. This project will represent the pivotal step in the technology development/engineering demonstration phase of the deployment program. This facility will provide the confirmation of process science and technology at full scale, the development and demonstration of plant-size components, and the integration of all of the process systems at plant scale. With this information, AVLIS potential can be projected with confidence as a part of the U.S. enrichment planning process.

[1/] This request is to fund design work only which will better define the total estimated cost of the DDM. The DDM is currently estimated to cost between $200,000,000 - $250,000,000.

Oak Ridge Operations

1. Title and location of project: Development/Demonstration Module, Oak Ridge, Tennessee (Design Only) 2. Project No. 84-N-407

8. Brief Physical Description of Project: (Continued)

A building of approximately 100,000 square feet will be constructed at the Oak Ridge Gaseous Diffusion Plant. The floor houses the separator module, the lasers, the special facilities required for maintenance and refurbishment of these systems, the central control room, personnel offices, the process power, vacuum and cooling systems for the separator module, dye pumping systems for the dye lasers, and maintenance facilities.

The primary special facilities are the separator module and the lasers. The separator module is a double-wall, water-cooled vessel of stainless steel in which uranium is melted, vaporized, illuminated by laser light, collected, and cast. The laser system consists of dye master oscillators, dye power amplifiers, copper vapor pump lasers, and beam optics. Optics and beam transport equipment serve to properly combine beams and transport them to the separator module. A computer system provides local and central process control and data management.

9. Purpose, Justification of Need For, and Scope of Project:

On April 30, 1982, the Department announced the selection of the AVLIS process for continuation of research and development and the initiation of engineering development.

The purpose of the Development/Demonstration Module is to demonstrate the operation of an integrated production scale module of the AVLIS process which will establish the engineering, operational, and cost basis for AVLIS production facilities. This facility will provide the confirmation of process science and technology at full scale, the development and demonstration of plant-size components, and the integration of all the process systems at plant scale. With this information, AVLIS potential can be projected with confidence as a part of the U.S. enrichment planning process.

The requested $2,400,000 in obligations in FY 1984 will be used for design work only.

10. Details of Cost Estimate:

Details of the cost estimate will be developed in FY 1983 after completion of the updated conceptual engineering design.

11. Method of Performance:

Design will be accomplished on the basis of a negotiated architect-engineering contract and operating contractors. Building construction will be accomplished by fast tract methods with fixed price subcontracts and procurement to be awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

Ridge Operations

Title and location of project: Development/Demonstration Module, Oak Ridge, Tennessee (Design Only)

2. Project No. 84-N-407

Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs			To be determined				
1. Total facility costs							
(a) Construction line item	$ 0	$ 0	$	$	$	$	$
(b) PE&D funds	0	0					
(c) Expense funded equipment	0	0					
(d) Inventories	0	0					
Total facility costs	$ 0	$ 0	$	$	$	$	$
2. Other project costs							
(a) R&D necessary to complete construction	$ 0	$ 0	$	$	$	$	$
(b) Conceptual design costs	235	2,400					
(c) Other project related costs	0	0					
Total other project costs	235	2,400					
Total project costs	$ 235	$ 2,400	$	$	$	$	$ 1/

b. Other related annual costs	
1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
To be determined
b. Other related annual costs
To be determined

The DDM is currently estimated to cost between $200,000,000 - $250,000,000.

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CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

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1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

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3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1988[1]

5. Previous cost estimate:
Date: 12/81 $14,000

6. Current cost estimate:
Date: 12/82 $14,000

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7. **Financial Schedule:**

Fiscal Year	Authorizations	Appropriations	Obligations	Costs[1]
1983	$ 7,000	$ 7,000	$ 7,000	$ 300
1984	7,000	7,000	7,000	1,900
1985	0	0	0	6,800
1986	0	0	0	3,000
1987	0	0	0	1,000
1988	0	0	0	1,000

8. **Brief physical description of project:**

This project will remove sixteen existing 345 kV oil filled circuit breakers from the X-533 switchyard and replace them with sixteen new gas filled circuit breakers with a higher interrupting capacity. Modifications to existing circuit breaker foundations and bus configurations will be made as necessary to receive the new breakers. In addition, this project will replace all cables and related duct work terminating at the oil filled circuit breakers.

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[1] It is uncertain whether this project will be approved for initiation in FY 1983 under the Continuing Resolution. As a result, it may not be possible to maintain the construction and funding schedules currently included in this data sheet.

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

8. Brief Physical Description of Project: (Continued)

A gas storage and transfer trailer will be purchased for use during breaker installations and for future performance of breaker maintenance functions. A prefabricated metal building, approximately 1,500 square feet in size, will be constructed in the switchyard for storage of the trailer, gas cylinders, and other equipment required for breaker maintenance.

9. Purpose, Justification of Need for, and Scope of Project:

The X-533 switchyard 345 kV oil filled circuit breakers have been in service since 1954. Certain critical components of the oil circuit breakers are no longer available. As a result, these breakers have become obsolete. This situation requires the systematic replacement of individual breakers and the cannibalization of the replaced breakers for their usable parts.

Due to recent and predicted future load growth on the region's external power grid, the potential will exist by 1986 for exceeding the interrupting capacity of the existing circuit breakers in the event of a major system fault. This condition was identified in a recent study conducted by American Electric Power Service Corporation (AEPSC). A study by Gilbert-Commonwealth and Associates, conducted for the Department of Energy, has verified this information.

It is essential that all circuit breakers, especially those in 345 kV systems, be fully capable of safely interrupting any potential fault conditions to prevent serious hazards to personnel and major damage to onsite and offsite equipment and facilities. Based upon the predicted overduty condition and the inability to uprate the interrupting capacity of the existing obsolete breakers, there is no alternative other than to replace them with new breakers of modern design having interruping capacities sufficient to meet future potential fault levels.

The FY 1984 obligational authority of $7,000,000, requested herein, will be utilized to complete procurement and construction activities.

A delay in implementation of this project will not only risk the maintainability of the existing circuit breakers, but will seriously imperil the existing process and other electrical systems at the gaseous diffusion plant.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

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10. Details of Cost Estimate:[a]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 12% of construction cost, Item b.	$	$ 1,200
b. Construction costs		10,000
(1) Buildings	150	
(2) Utilities	9,850	
c. Standard equipment		60
Subtotal		11,260
d. Contingency at approximately 24% of above costs		2,740
Total estimated costs		$ 14,000[b]

11. Method of Performance:

Design and inspection will be performed by the operating contractor. The gas circuit breakers and gas transfer trailer will be procured by the operating contractor. To the extent feasible, construction will be accomplished by fixed price contract(s) awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs								
1. Total facility costs								
(a) Construction line item	$ 0	$ 300	$ 1,900	$ 6,800	$ 3,000	$ 1,000	$ 1,000	$14,000
(b) PE&D	0	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0
Total facility costs	$ 0	$ 300	$ 1,900	$ 6,800	$ 3,000	$ 1,000	$ 1,000	$14,000

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[a] The cost estimate is based on completed conceptual design.

[b] All costs have been escalated at the rate of 10% to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
2. Other project costs								
(a) R&D necessary to complete construction	0	0	0	0	0	0	0	0
(b) Conceptual design costs	70	0	0	0	0	0	0	70
(c) Other project related costs .	0	0	0	0	0	0	0	0
Total other project costs ...	70	0	0	0	0	0	0	70
Total project costs	$ 70	$ 300	$ 1,900	$ 6,800	$ 3,000	$ 1,000	$ 1,000	$14,070

b. Other related annual costs (estimated life of project components: 30 years)

1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs
      (a) No narrative required.
      (b) No narrative required.
      (c) No narrative required.
      (d) No narrative required.
   2. Other project costs
      (a) No narrative required.
      (b) Conceptual design report was completed in July 1981 at a cost of $70,000.
      (c) No narrative required.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

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13. Narrative explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

b. Other related annual costs--It is estimated that the project components will last 30 years.
    1. No narrative required.
    2. No narrative required.
    3. No narrative required.
    4. No narrative required.
    5. No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987[1]

5. Previous cost estimate:
Date: 12/81 $30,000

6. Current cost estimate:
Date: 12/82 $30,000

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs[1]
1983	$ 6,000	$ 6,000	$ 6,000	$ 800
1984	10,000	10,000	10,000	3,000
1985	14,000	14,000	14,000	19,200
1986	0	0	0	5,000
1987	0	0	0	2,000

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[1] It is uncertain whether this project will be approved for initiation in FY 1983 under the Continuing Resolution. As a result, it may not be possible to maintain the construction and funding schedules currently included in this data sheet.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project:	Compliance with toxic substances control act, gaseous diffusion plants	2. Project No. 83-N-402

8. Brief Physical Description of Project:

This project provides facilities for the handling, storage, transportation and disposal of polychlorinated biphenyl (PCB) materials at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. PCB is the only toxic substance for which standards have been established by the Environmental Protection Agency (EPA) to comply with the Toxic Substances Control Act (TSCA). A central facility will be constructed near the Oak Ridge Gaseous Diffusion Plant which will receive, store, handle, and dispose by incineration all PCB wastes from the three diffusion plants. Sludge and ash generated from the incineration process will be disposed of in appropriate facilities in an environmentally acceptable manner. Adequate facilities will be added at Paducah, Kentucky and Portsmouth, Ohio to supplement existing equipment presently provided to handle, store, and transport materials within the plants. Transportation of liquids to the central facility at Oak Ridge, Tennessee will be accomplished utilizing a dedicated tank truck or other approved method.

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to provide those facilities needed to comply with the TSCA relative to PCB's. The EPA, as mandated by law, established regulations on May 31, 1979, pertaining to the storage, use, handling, transportation, and disposal of these materials. Although two commercial disposal facilities have been approved by EPA, and other facilities are under review, none of these are or are expected to be licensed for handling radioactively contaminated PCB. Some of the waste PCB material on hand is contaminated with low-level uranium materials. It is necessary, therefore, to construct a facility for this disposal. The installation will be designed and sized with sufficient flexibility to dispose of other toxic and/or radioactive contaminated materials which may require incineration in accordance with EPA regulations.

The FY 1984 obligational authority of $10,000,000, requested herein, will provide for completion of the Title I and Title II architect engineering, additional procurement of major long-lead time equipment, award of contracts for land improvements, buildings and other structures, utilities, and part of the special equipment.

There are no alternatives except to proceed with this project to remain within the mandates of the TSCA.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total Cost
a. Engineering, design and inspection at approximately 26% of construction costs, item b	$ 4,520	$ 150	$ 130	$ 4,800
b. Construction costs	18,240	200	310	18,750
(a) Land improvements	600	10	40	650
(b) Buildings	1,500	190	260	1,950
(c) Other structures	200	-	-	200
(d) Special facilities	12,940	-	-	12,940
(e) Utilities	3,000	-	10	3,010
c. Standard equipment	440	10	-	450
Subtotal	23,200	360	440	24,000
d. Contingency at approximately 25% of above costs	5,800	90	110	6,000
Total estimated costs	$ 29,000	$ 450	$ 550	$ 30,000[b]

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract and by the Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts and subcontracts awarded on the basis of competitive bidding. The Operating Contractor may purchase certain unique equipment and equipment requiring long-lead time. The Operating Contractor will also be responsible for any final utility tie-ins.

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[a] The cost estimate is based on completed conceptual design.

[b] All costs have been escalated at the rate of 10% to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$ 800	$ 3,000	$19,200	$ 5,000	$ 2,000	$30,000
(b) PE&D funds	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	$ 0	$ 800	$ 3,000	$19,200	$ 5,000	$ 2,000	$30,000
2. Other project costs							
(a) R&D necessary to complete construction	$ 300	$ 0	$ 0	$ 0	$ 0	$ 0	$ 300
(b) Conceptual design costs	852	0	0	0	0	0	852
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	1,152	0	0	0	0	0	1,152
Total project costs	$ 1,152	$ 800	$ 3,000	$19,200	$ 5,000	$ 2,000	$31,152

b. Other related annual costs (estimated life of project facilities: 20 years)

1. Facility operating costs	$ 2,500
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	1,700
Total other related annual costs	$ 4,200

Oak Ridge Operations

1. Title and location of project:	Compliance with toxic substances control act, gaseous diffusion plants	2. Project No. 83-N-402

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
  1. Total facility costs
    (a) No narrative required.
    (b) No narrative required.
    (c) No expense funded equipment will be required.
    (d) No significant increase in existing inventories will be required for the project. Specific materials may be defined during design or construction that may have to be added to inventory, but these cannot be identified at this time.
  2. Other project costs
    (a) Research and development required to determine operating parameters, efficiencies and limitations for design are estimated at $300,000.
    (b) Conceptual design costs were $852,000.
    (c) No other project funding is known to be required.

b. Other related annual costs - It is estimated the facilities will be used 20 years for their programmatic purpose.
  1. Facility operating costs are estimated at the three sites to total $2,500,000 per year for operating labor, maintenance labor and work materials.
  2. Monitoring and reporting are now being done as required.
  3. No narrative required.
  4. No narrative required.
  5. It is estimated that operating, testing and start-up costs will be approximately $1,700,000.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

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1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants

2. Project No. 83-N-405

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3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987[1/]

5. Previous cost estimate:
Date: 12/81 $25,000

6. Current cost estimate:
Date: 12/82 $25,000

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs[1/]
1983	$ 8,000	$ 8,000	$ 8,000	$ 2,000
1984	10,000	10,000	10,000	4,200
1985	7,000	7,000	7,000	9,300
1986	0	0	0	6,600
1987	0	0	0	2,900

[1/] It is uncertain whether this project will be approved for initiation in FY 1983 under the Continuing Resolution. As a result, it may not be possible to maintain the construction and funding schedules currently included in this data sheet.

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants 2. Project No. 83-N-405

8. Brief Physical Description of Project:

This project will provide for the upgrading of selected utility systems which serve various important cascade support functions at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. Specifically, the following are included: at Oak Ridge, refurbish some of existing coal-fired boilers at the Steam Plant, replace the 2.5 million gallon sanitary water tank, replace the 2400 V substation at the K-1004A Laboratory with a 13.8 kV system, replace transformers and associated electrical equipment at the Feed and Tails Withdrawal Facility and the Decontamination and Uranium Recovery Building; at Paducah, replace approximately 25 percent of the circuit breakers in the process auxiliary substations and the emergency power switchgear in the C-310 Purge Cascade and the C-331 and C-333 Process Buildings, and replace the switchgear for the plant raw water pumps; at Portsmouth, replace substation and distribution equipment at the X-501 and the X-501A Distribution Center, replace selected air compressors in the Dry Air Plant, replace the substation and motor control centers in the Decontamination Building, and replace selected components of process auxiliary substations for the X-300 Plant Control Facility and the X-342 Feed Vaporization Building.

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to renovate, upgrade or replace utility systems or components vital to the continued reliable operation of the diffusion cascade and support buildings. This will provide a programmed replacement of selected equipment that has become worn out, obsolete, and unreliable. The replacements as proposed will provide new and/or upgraded equipment needed to improve the safety, reliability and efficiency of plant operations for the long-term future.

The reinforced concrete 2.5 million gallon sanitary water tank at Oak Ridge is structurally defective and has developed cracks which limit the storage capacity of the tank to 50 percent. All of the other equipment included in this project: (1) has exceeded its expected life; (2) is difficult to maintain due to spare parts being no longer available; and (3) has high repair and maintenance costs. Some of the electrical equipment being replaced will provide a source of spare parts needed to maintain similar equipment remaining in service.

The FY 1984 obligational authority of $10,000,000, requested herein, will provide for completion of Title I and Title II engineering, completion of the major procurements and some construction.

It is anticipated that this project will reduce annual maintenance costs.

A delay in the implementation of this project will result in the continued deterioration of these critical systems and increase the risk of serious operational interruptions to the diffusion cascades.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants   2. Project No. 83-N-405

10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total
a. Engineering, design, and inspection at approximately 22% of construction cost, item b	$ 1,970	$ 875	$ 800	$ 3,645
b. Construction costs	8,505	3,850	3,870	16,225
(1) Building modifications	0	0	0	0
(2) Special facilities	3,200	2,800	740	6,740
(3) Utilities	5,305	1,050	3,130	9,485
Subtotal	10,475	4,725	4,670	19,870
c. Contingency at approximately 25% of above costs	2,725	1,175	1,230	5,130
Total estimated costs	$13,200	$ 5,900	$ 5,900	$25,000[b]

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract except for some switchgear replacements which will be accomplished by the operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontract(s) awarded on the basis of competitive bidding.

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[a] Cost estimate based on completed conceptual design.

[b] All costs have been escalated at the rate of 10% to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants   2. Project No. 83-N-405

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$2,000	$4,200	$11,600	$6,600	$2,900	$25,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	2,000	4,200	11,600	6,600	2,900	25,000
2. Other project costs							
(a) R&D necessary to complete construction .	0	0	0	0	0	0	0
(b) Conceptual design costs	389	0	0	0	0		389
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	389	0	0	0	0	0	389
Total project costs	$389	$2,000	$4,200	$11,600	$6,600	$2,900	$25,389

b. Other related annual costs (estimated life of project facilities: 20 years)

1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs
      (a) No narrative required.
      (b) No narrative required.
      (c) No narrative requried.
      (d) No narrative required.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants 2. Project No. 83-N-405

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

2. Other project costs
   (a) No narrative required.
   (b) Conceptual design report was completed at a cost of $389,000.
   (c) No narrative required.

b. Other related annual costs - It is estimated the facilities will be used 20 years for their programmatic purpose.
   1. No narrative required.
   2. No narrative required.
   3. No narrative required.
   4. No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants

2. Project No. 82-R-413

3. Date A-E work initiated: 2nd Qtr. FY 1982

5. Previous cost estimate:
Date: 12/81 $ 39,000

3a. Date physical construction starts: 4th Qtr. FY 1982

6. Current cost estimate:
Date: 12/82 $ 39,000

4. Date construction ends: 4th Qtr. FY 1986

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 7,100	$ 7,100	$ 7,100	$ 1,703
1983	20,900	20,900	20,900	5,000
1984	9,000	9,000	9,000	10,600
1985	2,000	2,000	2,000	16,897
1986	0	0	0	4,800

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants 2. Project No. 82-R-413

8. Brief Physical Description of Project:

This project provides improved containment facilities for various existing processes involving handling and transfer of either liquid or high pressure gaseous UF_6. Necessary modifications will be made to the original liquefaction systems for product and tails withdrawals and the existing transfer and new sampling facilities. Non-containment heating vessels for feed vaporization will be replaced with newly designed and improved containment autoclaves, and all existing high pressure autoclaves will be equipped with safety systems as dictated by ongoing safety analysis studies.

Feed Vaporization and Sampling Areas:

At all sites, the remaining existing non-containment autoclaves and steam hoods in use will be replaced with improved containment-type autoclaves. New improved containment-type autoclaves, capable of containing UF_6 and the associated reaction products in the event of failure within the autoclave of such components as the flexible copper tubing (pigtail) or the cylinder valves, will be installed with redundant isolation valving. The new units, five at Oak Ridge and seventeen at Paducah, will be similar to the autoclaves being provided as a part of Project 77-9-a, "Expansion of Feed Vaporization and Sampling Facilities, GDPs." In addition, two low pressure autoclaves at Oak Ridge and two at Portsmouth will be uprated to provide improved containment capability. Autoclaves and building areas will be instrumented to detect leaks of UF_6.

Liquid UF_6 Withdrawal Areas

Where required at the three sites, existing single-ply expansion joints will be replaced with buffered expansion joints, and non-buffered valves (except cylinders valves) will be replaced with buffered valves. The capability to isolate "pigtail" connectors, through the use of remote operated dual valving installed between feed or withdrawal lines and receiving cylinders, will be provided. Alarm and leak detection systems will be installed. Double-hook cranes will be installed to facilitiate movement of liquid UF_6 cylinders.

High Assay Sampling Area (HASA) - Portsmouth

The High Assay Sampling Area will be modified to assure a safe means of sampling and transferring material in 5-inch, 8-inch, and 12-inch diameter cylinders. The system will also have the capability of emptying sample cylinders. The system will be designed to prevent operator exposure to liquid and gaseous UF_6 and will provide for ease of decontamination in the event of a release.

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants 2. Project No. 82-R-413

9. Purpose, Justification of Need for, and Scope of Project:

The justification for this project is twofold: 1) It will provide for a safer, more efficient operation utilizing new autoclaves and double-hook cranes; and 2) It will reduce the potential for major and minor UF_6 releases with associated hazards to personnel, limit the release of toxic material to the environment, and reduce the loss of valuable UF_6 material. Originally, UF_6 feed and transfer operations at the gaseous diffusion plants were accomplished through the use of open-type, metal-sided steam chests which provided no containment capability and offered little operational flexibility. Several years ago, many of these open vessels had deteriorated beyond economical repair and were replaced with low pressure autoclaves. Within recent years, high pressure autoclaves, designed to provide improved containment, have been utilized as replacements for both of the above vessel types. The inherent improved safety features of these autoclaves have enhanced personnel protection and simplified the operational procedures. This project completes the replacement of all remaining non-containment vessels with improved containment-type autoclaves. Additionally, certain other safety systems are being incorporated to minimize the potential release of UF_6 to the atmosphere in relatively high risk areas where liquid UF_6 is handled.

A review of liquid UF_6 cylinder handling by existing cranes, considering the lift height, proximity of personnel and enclosed areas of movement, has resulted in the determination that double-hook cranes be installed in certain areas to improve the operational reliability and safety of cylinder handling.

A delay in this project would result in a corresponding delay in providing improved safety and UF_6 containment measures and would prolong the potential exposure of plant populations and the public to a higher risk of accidental release of hazardous materials.

FY 1984 obligations of $9,000,000 will be utilized to complete procurement, and continue construction and Title III engineering.

No significant increase in operating cost will result through implementation of this project.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants	2. Project No. 82-R-413

10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total Cost
a. Engineering, design and inspection at approximately 25% of construction costs, Item b	$ 1,300	$ 3,300	$ 1,850	$ 6,450
b. Construction costs	5,300	13,300	7,300	25,900
(1) Building modifications (including closing of open building sides, and special containment enclosures)	100	1,950	450	2,500
(2) Special facilities (including autoclaves, special sampling systems, and special instrumentation)	5,200	11,300	6,800	23,300
(3) Outside utilities	0	50	50	100
Subtotal	6,600	16,600	9,150	32,350
c. Contingency at approximately 21% of above costs	1,400	3,400	1,850	6,650
Total estimated costs	$ 8,000	$ 20,000	$ 11,000	$ 39,000[b]

11. Method of Performance:

Design and inspection of facility modifications and equipment installations will be performed under a negotiated Architect-Engineer contract. Design and inspection of the autoclaves and the unique instrumentation will be by the Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and sub-contracts(s) awarded on the basis of competitive bidding.

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a/ The estimate is based on completed conceptual design.

b/ All costs have been escalated at the rate of 10 percent to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants   2. Project No. 82-R-413

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$1,703	$5,000	$10,600	$16,897	$4,800	$39,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	1,703	5,000	10,600	16,897	4,800	39,000
2. Other project costs							
(a) R&D necessary to complete construction	212	90	0	0	0	0	302
(b) Conceptual design costs	954	0	0	0	0		954
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	1,166	90	0	0	0	0	1,256
Total project costs	$1,166	$1,793	$5,000	$10,600	$16,897	$4,800	$40,256

b. Other related annual costs (estimated life of project facilities: 20 years)

1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants	2. Project No. 82-R-413

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
  1. Total facility costs
    (a) No narrative required.
    (b) No narrative required.
    (c) No narrative required.
    (d) No narrative required.
  2. Other project costs
    (a) R&D necessary to complete development work to define HASA requirements. $302,000
    (b) Conceptual design completed on March 9, 1981 at a cost of $954,000.
    (c) No narrative required.

b. Other related annual costs - It is estimated the facilities will be used 20 years for programmatic purposes.
  1. No narrative required.
  2. No narrative required.
  3. No narrative required.
  4. No narrative required.
  5. No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416 1/

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 3th Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate:
Date: 12/81 $ 5,000

6. Current cost estimate:
Date: 12/82 $ 5,500 2/

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 2,000	$ 0	$ 0	$ 0
1983	3,000	5,000	5,000	500
1984	3,500	3,500	3,500	200
1985	2,000	2,000	2,000	1,800
1986	0	0	0	2,200
1987	0	0	0	800

1/ Project was submitted in FY 1982 and authorized but not appropriated. The project was resubmitted in FY 1983, but it is uncertain whether it will be approved for initiation under the Continuing Resolution. The Department's FY 1984 funding request assumes no funding is received in FY 1983. Therefore, the Department will be unable to meet all 1984 Federal pollution control requirements on a schedule acceptable to the Environmental Protection Agency (EPA) and the State of Ohio regulatory agencies. The Department could be subject to fine and enforcement actions by the EPA and the State of Ohio regulatory agencies. This project is being reviewed in light of changing environmental requirements and the project total estimated cost may change accordingly.

2/ The increase in the project cost estimate results from escalation associated with a one-year slip in the project.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

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8. Brief Physical Description of Project:

This project provides facilities at the Portsmouth, Ohio gaseous diffusion plant to comply with existing State and Federal regulations pertaining to current environmental standards. The parameters of primary concern are discharges of pollutants to nearby streams and the pretreatment and disposal of solid and hazardous wastes.

Facilities will be installed at the Portsmouth, Ohio plant for the batch treatment of the effluents from the Laboratory Building and from the electrolytic cell cleaning activities. Solids generated by these new treatment facilities will be dewatered before being disposed of in an acceptable manner. An interim storage area for hazardous and toxic chemicals will be constructed to provide long-term storage of these materials.

9. Purpose, Justification of Need for, and Scope of Project:

This is Phase II of a multi-phase project designed to provide facilities at the gaseous diffusion plant to maintain compliance with National Pollutant Discharge Elimination System permits and Federal and State standards established under the Federal Water Pollution Control Act of 1972 as amended by the Clean Water Act of 1977.

The FY 1984 obligational authority of $3,500,000, requested herein, will provide for the completion of Titles I and II engineering and procurement, and construction.

A delay in implementation of this project will delay DOE's ability to comply with State and Federal standards regarding liquid effluents and solid waste disposal and can result in penalties for noncompliance.

The annual operating cost for these facilities is estimated to be $50,000.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

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10. Details of Cost Estimate:[a]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 25% of construction costs, Item b		$ 880
b. Construction costs		3,495
(1) Land improvements	$ 30	
(2) Buildings (5,000 sq. ft. @ approximately $100/sq. ft.)	500	
(3) Other structures	100	
(4) Special facilities (filters, clarifiers, and other process equipment)	2,465	
(5) Utilities	400	
c. Standard equipment		25
Subtotal		4,400
d. Contingency at approximately 25% of above costs		1,100
Total estimated costs		$ 5,500[b]

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract and by the Operating Contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts and subcontracts awarded on the basis of competitive bidding. The Operating Contractor may purchase certain unique equipment and that requiring long-lead time.

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[a] The cost estimate is based on completed conceptual design.

[b] All costs have been escalated at the rate of 10 percent to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

12. Funding Schedule of Project Funding and Other Related Funding Requirements[1]

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$ 500	$ 200	$ 1,800	$ 2,200	$ 800	$ 5,500
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	500	200	1,800	2,200	800	5,500
2. Other project costs							
(a) R&D necessary to complete construction	65	25	30	20	0	0	140
(b) Conceptual design costs	200	0	0	0	0	0	200
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	265	525	30	20	0	0	340
Total project costs	$ 265	$ 525	$ 230	$ 1,820	$ 2,200	$ 800	$ 5,840

b. Other related annual costs (estimated life of project facilities: 15 years or until regulations change)

1. Facility operating costs	$ 50
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility.....	0
5. Other costs	0
Total other related annual costs	$ 50

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[1] Assumes no appropriations are received until FY 1984.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs
      (a) No narrative required.
      (b) No narrative required.
      (c) No expense funded equipment will be required.
      (d) No significant increase in existing inventories will be required for the project. Specific materials may be defined during design or construction that may have to be added to inventory, but these cannot be identified at this time.
   2. Other project costs
      (a) R&D activities will be required to further develop techniques for such facilities as sludge fixation and other chemical processes.
      (b) Conceptual design was completed in FY 1980 at a cost of approximately $200,000.
      (c) No other project funding is known to be required.

b. Other related annual costs - It is estimated the facilities will be used for 15 years or until regulations change.
   1. Facility operating costs are estimated at the three sites to total $50,000 per year for utilities, maintenance labor and worked materials.
   2. Monitoring and reporting are now being done as required.
   3. No capital equipment will be required for the related programmatic effort.
   4. No maintenance, repair, GPP or other construction will be required for the related programmatic effort.
   5. No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

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1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506[1/]

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3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate:
Date: 12/81 $31,000

6. Current cost estimate:
Date: 12/82 $33,000[2/]

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$ 0	$ 0	$ 0	$ 0
1982	7,000	0	0	0
1983	4,950	4,950	4,950	500
1984	3,500	3,500	3,500	1,000
1985	26,400	26,400	26,400	7,000
1986	3,100	3,100	3,100	11,600
1987	0	0	0	8,300
1988	0	0	0	4,600

1/ Project was submitted in FY 1981 but was neither authorized nor appropriated. Project was resubmitted in FY 1982 and authorized but not appropriated. The project was resubmitted in FY 1983, but it is uncertain whether it will be approved for initiation under the Continuing Resolution. The Department's FY 1984 funding request assumes no funding is received in FY 1983. Therefore, the Department will be unable to meet all 1984 Federal pollution control requirements on a schedule acceptable to the Environmental Protection Agency (EPA) and the States regulatory agencies. The Department could be subject to fine and enforcement actions by the EPA and States regulatory agencies. This project is being reviewed in light of changing environmental requirements and the project total estimated cost may change accordingly.

2/ The increase in the project cost estimate results from escalation associated with a one year slip in the project.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

8. Brief Physical Description of Project:

This project provides facilties at the gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, to further reduce the discharge of pollutants to nearby streams and to pretreat and dispose of the solid wastes generated at each site. These facilities are required to comply with the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977; the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976; and DOE Regulations, Chapter 0511, "Radioactive Waste Management." The parameters of primary concern are heavy metals, uranium, transuranics, chromates, nitrates, fluorides, suspended solids, chlorinated hydrocarbons, chemical oxygen demand, biomass slurry, calcium carbonate, aluminum hydroxide, and the sludges generated from the disposal treatment of these materials.

At Oak Ridge, the acidic and metallic salt effluents from the coal pile runoff, the Metals Preparation Facility, the Steam Plant, and the Metals Treatment Facility will be collected and processed to remove metals from the effluent discharges. Sluges created during processing will be dewatered and fixed before disposal. Effluents, containing uranium, transuranics, fluorides and other impurities, emanating from the decontamination faciity spray booth rinse, the floor pan, and the cylinder cleaning operation, will be processed before discharge to an existing pond. Sludges generated will be fixed before disposal in suitable containers or an approved landfill. The waste considered in this project includes classified solids, potentially hazardous chemical waste, and solid waste. The potentially hazardous chemical wastes include the chemical sludges generated at such facilities as the fluoride scrubbers in the Purge Cascade and the maintenance shops, the chromium sludges from the blowdown treatment in the recirculating cooling water (RCW) system, sludges from the Uranium Decontamination and Recovery Facility presently stored in a Retention Basin and sludges now being collected in another Retention Basin. A chromium sludge collection facility and a central solid waste disposal facility will be provided for dewatering and fixing these sludges before storage in suitable containers as well as for treatment of the water extracted from the sludges.

At Paducah, a treatment facility will be installed to provide source treatment of concentrated solutions from the chemical cleaning and recovery operations. This facility will include processing equipment to treat discharges from cleaning and rinsing operations and the degreaser. A new oil and chemical storage shelter will be provided for drummed hazardous materials. Facilities will be provided for dewatering and chemical fixation of hazardous and toxic sludges. New facilities will be constructed to provide proper disposal of all hazardous and toxic materials generated at the plant. A fly ash settling basin will be provided for the steam plant. Vents and dikes will be installed around the hazardous storage area.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

8. Brief Physical Description of Project: (Continued)

At Portsmouth, a biodenitrification system will be installed to reduce nitrates in effluents from the Decontamination Building and the Cleaning Building.

The treated liquid effluents emanating from the biodenitrification and batch treatment facilities will be routed to the existing Sewage Treatment Plant, and the corresponding sludges will be properly handled. Sludge disposal facilities will be constructed to process the water treatment effluents.

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this multi-site project is to provide facilities to maintain compliance with NPDES permits, Federal, Tennessee, Kentucky, and Ohio State Standards established under the Federal Water Pollution Control Act, as amended by the Clean Water Act, and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

The scope of this project at the three gaseous diffusion plants has been developed through a careful examination of existing effluent streams and determination of those areas where a high potential exists for exceeding effluent standards to be established as a result of implementation of Federal and State legislation. The facilities will be further examined for compatibility with the existing proposed regulations and with any future promulgations regarding environmental practices for the disposal of solid waste. It may be necessary to alter some of the proposed control measures in this project to meet changing regulations or to take advantage of improved technologies.

The FY 1984 obligational authority of $3,500,000 requested herein, will provide for initiation of the Titles I and II engineering and initiation of some equipment procurement.

The annual operating costs will be increased by about $1,500,000 at the three sites upon completion of this project.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

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10. Details of Cost Estimate:[a]

	Oak Ridge	Paducah	Portsmouth	Total
a. Engineering, design and inspection at approximately 22% of construction cost, Item b	$ 2,500	$ 1,070	$ 980	$ 4,550
b. Construction costs	11,250	5,030	4,400	20,680
(1) Improvements to land	500	25	340	865
(2) Buildings (37,500 sq. ft. @ approximately $100/sq. ft.)	1,550	405	1,800	3,755
(3) Other structures	0	685	0	685
(4) Special facilities (filters, clarifiers, and other process equipment)	9,000	3,855	1,860	14,715
(5) Utilities	200	60	400	660
c. Standard equipment	1,550	0	0	1,550
Subtotal	15,300	6,100	5,380	26,780
d. Contingency at approximately 23% of above costs	3,600	1,400	1,220	6,220
Total estimated costs	$ 18,900	$ 7,500	$ 6,600	$ 33,000[b]

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract and by the Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts and subcontracts awarded on the basis of competitive bidding. The Operating Contractor may purchase certain unique equipment and that requiring long-lead time.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:[c]

	Prior Year	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs										
1. Total facility costs										
a) Construction line item	$ 0	$ 0	$ 0	$ 500	$ 1,000	$ 7,000	$11,600	$ 8,300	$ 4,600	$33,000
b) PE&D funds	0	0	0	0	0	0	0	0	0	0
c) Expense funded equipment	0	0	0	0	0	0	0	0	0	0
d) Inventories	0	0	0	500	0	0	0	0	0	0
Total facility costs	0	0	0	0	1,000	7,000	11,600	8,300	4,600	33,000

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a/ The cost estimate is based on completed conceptual design.

b/ All costs have been escalated at the rate of 10 percent to current year costs based upon the methodology approved for the Oak Ridge Operations Office.

c/ Assumes no appropriations are received until FY 1984.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	Prior Year	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
2. Other project costs										
(a) R&D necessary to complete construction......................	1,370	210	100	0	0	0	0	0	0	1,680
(b) Conceptual design costs	865	0	0	0	0	0	0	0	0	865
(c) Other project related costs	0	0	0	0	0	0	0	0	0	0
Total other project costs	2,235	210	100	0	0	0	0	0	0	2,545
Total project costs	$2,235	$ 210	$ 100	$ 500	$1,000	$7,000	$11,600	$8,300	$4,600	$35,545

b. Other related annual costs (estimated life of project facilities: 15 years or until regulations change)

1. Facility operating costs	$ 1,500
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 1,500

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs
      (a) No narrative required.
      (b) No narrative required.
      (c) No expense funded equipment will be required.
      (d) No significant increase in existing inventories will be required for the project. Specific materials may be defined during design or construction that may have to be added to inventory, but these cannot be identified at this time.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

2. Other project costs
   - (a) R&D activities will be required to further develop techniques for such facilities as sludge fixations, biodenitrification and other chemical processes.
   - (b) Conceptual design was completed in FY 1979 at a cost of $865,000.
   - (c) No other project funding is known to be required.

b. Other related annual costs - It is estimated the facilities will be used 15 years or until regulations change.
1. Facility operating costs are estimated at the three sites to total $1,500,000 per year for utilities, maintenance labor and work materials.
2. Monitoring and reporting are now being done as required.
3. No capital equipment will be required for the related programmatic effort.
4. No maintenance, repair, GPP or other construction will be required for the related programmatic effort.
5. No narrative required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

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1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

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3. Date A-E work initiated: 4th Qtr. FY 1976

3a. Date physical construction starts: 3rd Qtr. FY 1977

4. Date construction ends: 4th Qtr. FY 1994[1]

5. Previous cost estimate:
Date: 12/81 $2,152,845

6. Current cost estimate:
Date: 12/82 $2,699,845[2]

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1976	$ 25,000	$ 12,630	$ 7,595	$ 0
Transition Quarter	0	0	2,652	2,185
1977	230,000	167,325	168,763	18,911
1978	107,630	150,000	147,592	45,737
1979	150,000	150,000	150,610	126,314
1980	322,675	322,675	189,777[3]	238,076
1981	149,215	149,215	281,469[3]	336,308
1982	601,000	588,000	590,635	443,962
1983	588,000	588,000	588,752	600,000
1984	572,000	572,000	572,000	601,600
After 1984	0	0	0	286,752

1/ Construction of the first process building began in FY 1979. The first two buildings (capacity 2.2 million SWU per year) will be completed in 1989, providing a reasonable minimum plant. Follow-on capacity will be added in increments of 1.7 million SWU per year with completion of the full eight process buildings in FY 1994.

2/ Appropriations requested to date. Total line item project cost will be $7,450,000,000 in FY 1984 dollars, assuming project completion in FY 1994.

3/ Reflects Congressional deferral of $135,000,000 in obligations from FY 1980 to FY 1981.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

8. Brief physical description of project:

This project provides approximately 13.2 million separative work units (SWU) per year of additional enrichment capacity through construction of new gas centrifuge enrichment facilities which will consist of eight process buildings, a recycle/assembly building, necessary auxiliaries, and other administrative, support, test, service facilities, and domestic and international safeguards as required.

In addition, other new and modified facilities such as hot water pumping facilities, sanitary water facilities, and electric facilities will be provided as required. Temporary construction buildings, and facilities will also be provided for the construction contractor(s). Railway spurs, roads, and other land improvements will be provided as required. Certain other new and/or modified facilities will be provided at the production site and the development sites, such as administration facilities, training facilities, and test facilities.

Each process building consists of operating bays containing the centrifuges, plus service bays containing all auxiliary equipment. The recycle/assembly building will be a multi-level enclosed building with an open area for receiving and storage. Facilities provided will include incoming parts receiving and storage; uprighting and balancing stations for rotors; assembly areas with conveyors and fixtures for assembly of all major subassemblies; equipment for vacuum testing; final inspection stations; disassembly stands; decontamination facilities; scrap processing stations; office areas; and maintenance facilities. Major items of automatic data processing equipment associated with the first two process buildings include: 1) Class "A" Fire Alarm System-Computer Based, $465,000; 2) Process Control and Data Acquisition System, $8,113,000; 3) Security System-Computer Based, $588,000; 4) Integrated Data Management System, $4,282,000; and Rotor Balance Stands Computers, $1,337,000.

The FY 1984 obligational authority will provide primarily for completion of design engineering, and continuation of technical assistance, procurement (including centrifuge machines), and construction activities initiated in prior fiscal years, and for new efforts initiated in FY 1984. These activities are keyed to milestones for completing and achieving full operational capability of: the "Early Train" in September 1985; process building no. 1 in June 1988; and process building no. 2 in October 1989. The procurement and construction activities to meet these milestones have been tailored in scope and schedule to satisfy the dual objectives of minimizing total project costs and year-end uncosted obligations.

1. Title and location of project: Enriched uranium production facilities,
Portsmouth, Ohio

2. Project No. 76-8-g

8. Brief Physical Description of Project: (Continued)

During FY 1984, new firm fixed price procurement and construction contracts will be placed (consistent with the project milestones described above) which will incur costs in FY 1984 and beyond. During FY 1984, design engineering will be completed for all plant facilities. Technical assistance by the operating contractors will continue to be funded to review procurements, inspect procured equipment, do prototype testing and prepare miscellaneous designs and studies. New fixed price contracts for procurement of process and process support equipment such as cranes and valves for Process Building Nos. 1 and 2; miscellaneous equipment for the Recycle/Assembly Building; procurement equipment for the feed and withdrawal building, and other equipment for the plant support facilities will be made. New fixed price contracts for construction will be placed for the installation of special equipment in the Recycle/Assembly Building and centrifuge training and test facility, piping and equipment installation in the feed and withdrawal building, building of additional plant support facilities, miscellaneous minor structures and site improvements such as portals and parking lots.

9. Purpose, Justification of Need for, and Scope of Project:

The cost of production from the gas centrifuge enrichment plant will be significantly lower than the production cost of the existing gaseous diffusion plants, in current year dollars. With escalation factored in, the difference in production costs becomes very large. Construction of the gas centrifuge enrichment plant yields superior benefits both to the Government and its customers in terms of improved economics. Without the centrifuge plant, the United States will price itself out of the enrichment business.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

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1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

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10. Details of Cost Estimate (appropriations requested to date):

	Item Cost	Total Cost
a. Engineering, design and inspection	$	$ 470,000
b. Land and land rights		225
c. Construction costs		1,694,000
(1) Improvements to land	45,000	
(2) New buildings and additions	495,000	
(3) Building modifications	49,000	
(4) Special facilities	1,003,000	
(5) Other structures	44,000	
(6) Outside utilities	58,000	
d. Standard equipment		21,000
Subtotal		2,185,225
e. Technical support		318,000
f. Gaseous diffusion activities		17,000
Subtotal		2,520,225
g. Contingency at approximately 7.0%		179,620
Total estimated costs		$2,699,845[a]

11. Method of Performance:

Overall project management and coordination is being performed by the Department, plant construction and procurement is accomplished by cost-reimbursable contracts and fixed-price prime contracts and subcontracts awarded on the basis of competitive bids to the extent feasible. The operating contractors will perform certain tie-ins as required and procure certain unique and/or long delivery equipment. The Department has prime procurement responsibility for the gas centrifuge machines.

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a/ All costs have been escalated to current year dollars based upon the methodology approved for the Oak Ridge Operations Office.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	FY 1984 Dollars					
	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
a. Total project costs						
1. Total facility costs						
(a) Construction line item	$1,811,493	$601,600	$600,000	$600,000	$600,000	$600,000
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	1,811,493	601,600	600,000	600,000	600,000	600,000
2. Other project costs						
(a) R&D necessary to complete construction	21,600	0	0	0	0	0
(b) Other project related costs	19,549	34,500	61,000	72,000	101,000	128,000
Total other project costs	41,149	34,500	61,000	72,000	101,000	128,000
Total project costs....................	$1,852,642	$636,100	$661,000	$672,000	$701,000	$728,000

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Geothermal Resources Development Fund

For carrying out the Loan Guarantee and Interest Assistance Program as authorized by the Geothermal Energy Research, Development and Demonstration Act of 1974, as amended, $2,100,000, to remain available until expended: Provided, That the indebtedness guaranteed or committed to be guaranteed through funds provided by this or any other appropriation Act shall not exceed the aggregate of $500,000,000.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

GEOTHERMAL RESOURCES DEVELOPMENT FUND

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL.			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1			
SUBTOTAL.			
GS-18			
GS-17			
GS-16			
GS/GM-15			
GS/GM-14			
GS/GM-13	1	1	1
GS-12	1	1	1
GS-11			
GS-10			
GS-9			
GS-8			
GS-7			
GS-6			
GS-5			
GS-4			
GS-3			
GS-2			
GS-1			
SUBTOTAL.	2	2	2
UNGRADED			
TOTAL PERMANENT POSITIONS	2	2	2
UNFILLED POSITIONS, END OF YEAR . . .			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	2	2	2

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Geothermal Resources Development Fund

The goal of the program is to minimize financial risk so that private sector credit can be made available for geothermal projects. Further, the program strives to develop normal borrower-lender relationships which will provide financing of geothermal projects without Federal assistance.

The Geothermal Loan Guaranty Program is authorized under the Geothermal Energy Research, Development and Demonstration Act of 1974 (Public Law 93-410), as amended by both the Department of Energy Act of 1978 - Civilian Applications (Public Law 95-238) and The Energy Security Act of 1980 (Public Law 96-294).

Prior Year Accomplishments include:

- Established Headquarters Review Panel and developed accelerated review procedures.
- Considered a total of eleven applications in FY 1982. Decisions were made on 8; and 3 are still in process.
- Conditionally approved four applications totalling $152.4 million. (Prior guarantees issued total $136 million.)
- Announced the restrictions on acceptance of applications for new projects in the Federal Register March 1, 1982.

Specific Objectives for FY 1984 to FY 1987, formulated in response to Public Laws are:

- Implement and manage program operations and procedures.
- Provide government oversight of all associated operations.
- Monitor progress of Loan Guarantee projects against requirements and criteria set forth in The Guaranty Agreements.
- Prepare draft legislation and reports mandated by public law or requested by Congress.

Accomplishment of these specific objectives will help meet the requirements of pertinent Public Laws; and provide a stimulus for geothermal development by the private sector without additional Federal assistance.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

LEAD TABLE
Geothermal Resources Development Fund
(Tabular dollars in thousands. Narrative material in whole dollars)

Geothermal Resources Development Fund (CE)	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Interest Differential Payments				
Operating Expenses	$ 2,000 A/	$ 0	$ 0	$ 2,000
Subtotal	$ 2,000	$ 0	$ 0	$ 2,000
Loan Evaluation Fund				
Operating Expenses	$ (101) B/	$ 0	$ 0	$ 0
Subtotal	$ (101)	$ 0	$ 0	$ 0
Program Direction				
Operating Expenses	$ 200	$ 0	$ 0	$ 100
Subtotal	$ 200	$ 0	$ 0	$ 100
Total				
Operating Expenses	$ 2,200	$ 0	$ 0	$ 2,100
Geothermal Resources Development Fund	$ 2,200	$ 0	$ 0	$ 2,100
Staffing	3/3	2/2	2/2	2/2

A/ As a FY 1982 supplemental budget action, $14 million was reallocated from prior year unobligated Geothermal Resources Development - Loan Guaranty Reserve and Interest Differential Assistance Funds to the 50 MWe Geothermal Heber Demonstration project.

B/ Reflects $101,000 from FY 1981 for loan evaluation and monitoring.

Authorization: Title II P.L. 93-410. Title V, P.L. 95-238. Title VI, P.L. 96-294

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES

Geothermal Resources Development Fund
(dollars in thousands)

FY 1983 Appropriation enacted..	$ 0
Built in Increases and Decreases:	0
FY 1984 Base...	$ 0
Program Increases and Decreases:	
Interest Differential Payments	
o Continue annual interest differential assistance payments to the Northern California Power Agency................................	+$2,000
Program Direction	
o Funding to maintain staff of 2 full-time equivalent positions...	+ 100
FY 1984 budget request...	$2,100

FY 1984 Congressional Budget Request
Geothermal Resources Development Fund Narrative

Geothermal Loan Guarantee/ Interest Assistance	$2,000,000

Will provide funds toward meeting DOE's contractual obligations to the Northern California Power Agency for annual interest differential assistance payments.

Program Direction	$ 100,000

Two FTE positions are being requested to monitor outstanding multimillion dollar loan guarantee agreements, and perform required administrative functions.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Geothermal Resources Development Fund

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Interest Differential Payments	o Pay interest differential on guaranteed loan to the Northern California Power Agency as defined in DOE's contractual obligation under the loan guarantee agreement.	o Continue activities covered in FY 1983.
Loan Evaluation	o Review and process remaining 3 applications: - Southern California Edison ($57M) - Westmorland, CA ($35M) - COSO, CA ($60M-now in abeyance)	o No funds included for this activity in FY 1984.
Program Direction	o Implement and manage program operations. o Provide government oversight of all associated operations. o Prepare draft legislation and reports mandated by public law or requested by Congressional Committees.	o Continue activities covered in FY 1983.

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CONGRESSIONAL BUDGET REQUEST FY 1984

VOLUME 5

POWER MARKETING ADMINISTRATIONS
DEPARTMENTAL ADMINISTRATION

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
POWER MARKETING ADMINISTRATIONS
DEPARTMENTAL ADMINISTRATION
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DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	---	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities ..	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration ...	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration .	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration .	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration .	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund .	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	---	-3,331	---	-5,000	---	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	---	---	217,325	179,401	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	---	2,200	2,100	2,100
Special Foreign Currency	---	312	---	---	---	---
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607.862	9,982,297

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	FY 1984 Dollars						
	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 660,000	$575,000	$500,000	$490,000	$302,000	$109,907	$7,450,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	660,000	575,000	500,000	490,000	302,000	109,907	7,450,000
2. Other project costs							
(a) R&D necessary to complete construction	0	0	0	0	0	0	21,600
(b) Other project related costs	155,000	179,000	203,000	228,000	244,000	247,000	1,672,049
Total other project costs	155,000	179,000	203,000	228,000	244,000	247,000	1,693,649
Total project costs	$815,000	$754,000	$703,000	$718,000	$546,000	$356,907	$9,143,649

b. Other related annual costs (estimated life of project: 30 years)[1]

1. Facility operating costs	$ 247,000
2. Capital equipment not related to construction but related to programmatic effort in the facility	2,100
3. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	1,300
4. Other costs	14,700
Total other related annual costs	$ 265,100

---

[1] Average annual cost for the post-construction of the ten years following equivalent full production of the plant.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities,
Portsmouth, Ohio

2. Project No. 76-8-g

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs
      (a) Construction line item - see "Brief physical description of project."
      (b) PE&D - no requirements for funds identified at this time.
      (c) Expense funded equipment - no requirements for funds identified at this time.
      (d) Inventories - no requirements for funds identified at this time.

   2. Other project costs
      (a) R&D necessary to complete construction - no requirements for funds identified at this time. Advanced centrifuge development and demonstration funds are included in the gas centrifuge process development operating budget. Included in this category are prior year expenditures of $21,600,000 for conceptual engineering.
      (b) Other project related costs - these funds include $1,672,049,000 related to direct project support expense. Included are funds to support operating contractor personnel training, plant startup activities, operating costs of "on stream" facilities until the plant is fully operating, and funds to repair failed centrifuges after acceptance through project compliance. The capital cost includes technical support for the project.

b. Other related annual costs
   1. Facility operating costs - these costs include the annual costs required to assure that the plant will operate as required. The costs of maintenance, general and administrative labor, utilities (except electric power), and miscellaneous operating materials are included, as well as those costs directly related to the uranium enrichment program, including the costs of operating labor for the enrichment plant, recycle/assembly building, and auxiliary facilities, centrifuge replacement parts, and electric power.
   2. Capital equipment - these include the projected capital equipment requirements associated with the programmatic effort, not including construction. The startup of this or any new and unique facility will normally require some new capital equipment in the early years. These costs are projected from budget and operating experience at the existing Portsmouth Gaseous Diffusion Plant.
   3. General plant projects - office space renovation and modification, modification and upgrading of the utility system, security system upgrading, and miscellaneous building additions and modifications, etc.
   4. Other costs - additional funds will be expended for on-going plant support for the plant operating organization.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,081	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	---	39,213	---	23,491	---	---
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL.	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL.	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL.	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR . . .	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

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DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
POWER MARKETING ADMINISTRATIONS
BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Alaska	3,538	3,945	3,210
Bonneville	275,570	455,000	324,500
Southeastern	7,287	3,964	20,594
Southwestern	12,269	20,756	36,229
Western	210,774	149,750	219,630
Western Emergency Fund	500	337	500
Total, Power Marketing Administrations	509,938	633,752	604,663

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

ALASKA POWER ADMINISTRATION

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Operation and Maintenance, Alaska Power Administration

For engineering and economic investigations to promote the development and utilization of the water, power, and related resources of Alaska, and for necessary expenses of operation and maintenance of projects in Alaska and of marketing electric power and energy, $3,210,000, to remain available until expended, together with such sums as may be necessary to be available only upon a determination by the Secretary that such amounts are necessary to ensure continuity of service in the case of an emergency.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

ALASKA POWER ADMINISTRATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5	1	1	1
ES-4			
ES-3			
ES-2			
ES-1			
SUBTOTAL	1	1	1
GS-18			
GS-17			
GS-16			
GS/GM-15			
GS/GM-14	2	2	2
GS/GM-13	6	4	5
GS-12	2	2	2
GS-11	2	3	5
GS-10			
GS-9	2	2	1
GS-8	1	1	1
GS-7	1		1
GS-6	1	1	
GS-5	1		
GS-4			
GS-3			
GS-2			
GS-1			
SUBTOTAL	18	15	17
UNGRADED	16	16	16
TOTAL PERMANENT POSITIONS	35	32	34
UNFILLED POSITIONS, END OF YEAR			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	35	32	34

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Alaska Power Administration
(in thousands of dollars)

	FY 1983	FY 1984
Appropriation, Power Marketing	$ 3,945	$ 3,210
Real transfer to:	--	--
Real transfer from:	--	--
Comparative transfer to:	--	--
Comparative transfer from:	--	--
Subtotal, Budget Authority	$ 3,945	$ 3,210
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	$ 296	$ 939
Unobligated Balances, End of Year	- 939 1/	- 939
Total, Obligations	$ 3,302	$ 3,210

1/ Reflects difference between funding available under the continuing resolution and action taken by both Houses of Congress pursuant to H.R. 97-850 and Senate Report 97-673.

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,651
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	190	160	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,338	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,128	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,670	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX EMERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Power Marketing - Alaska Power Administration

The Alaska Power Administration is responsible for operation, maintenance, and power marketing for Alaska's two Federal hydroelectric projects -- the 30,000-kW Eklutna Project near Anchorage and the 47,160-kW Snettisham Project near Juneau. Operation and maintenance is accomplished in a manner that: ensures integrity of the Federal investment; maximizes reliability of service; maximizes energy production; and minimizes long-term costs. Power is marketed to achieve the most widespread use at lowest possible rates consistent with sound business principles and repayment requirements. Public benefits from other uses of project lands and facilities include visitations, recreation, and fisheries development.

APA has carried out planning work in future water and power development with emphasis on assistance and encouragement for non-Federal development of Alaskan renewable resources.

The FY 1984 request would provide necessary resources for continuation of the operation, maintenance, and marketing efforts, and limited funding to complete an orderly phase out of the planning work.

Actual FY 1982 and projected FY 1983 accomplishments include:

- Continued satisfactory progress on normal operation and maintenance activities for the Eklutna and Snettisham hydroelectric projects.
- Continued full utilization of energy and power capability of Eklutna Project; increased utilization of Snettisham Project firm energy from 68 percent in FY 1981 to an estimated 90 percent in FY 1982.
- Marketed 313 million kilowatt-hours in FY 1982 with gross revenues of $4,298,259; estimated FY 1983 amounts are 315 million kilowatt-hours and $4,391,000.
- Completion of following major maintenance and replacement items in FY 1982 and FY 1983:
  - Complete major turbine overhaul and related maintenance work at Eklutna Project.
  - Complete design and replacement of Eklutna Project office space to replace 30-year old, temporary wooden structure.
  - Complete construction of avalanche protection measures for Snettisham transmission line.
  - Purchase D-7 bulldozer to replace 1966 model at Snettisham Project.
- Completed emergency repairs for transmission tower failure on Snettisham Project line in March 1982, utilizing $50,000 appropriated for emergency purposes, and about $68,000 in other operation and maintenance funds. Implemented new transmission maintenance program designed to reduce hazards to future failure.
- Completed feasibility study for automation of Eklutna Project operations.
- Continued cooperation with the Corps of Engineers on design and scheduling of the authorized Crater Lake Unit of the Snettisham Project, with expected power-on-line date of 1986-1987.

- Continue cooperation with State of Alaska on State salmon hatchery at Snettisham Project; with Cook Inlet Aquaculture Association toward development of similar facility at Eklutna; and with Municipality of Anchorage on its proposed Eklutna water supply project.
- Completed power market and transmission analyses as input to Corps of Engineers General Design Memorandum for authorized Bradley Lake Project, and continuing cooperation with the Corps and the State on marketing and operation plans.
- Continue transmission and power market studies for other projects in Corps of Engineers' hydro study program.
- Continue reports on underwater, direct current transmission connection between Snettisham Project, Petersburg, Wrangell, and Ketchikan.
- Conclude evaluations of conservation and renewable resources alternatives and their potential for meeting energy power demands, including heat pump and electric transport options for Southeast Alaska, and continue evaluation of wind resource potentials in Bristol Bay area.
- Continue supporting studies on power statistics, evaluation of electric energy use matters,and load forecasts.

Specific objectives for FY 1984 to FY 1988:

- Perform all necessary maintenance to project facilities, including scheduling and installing necessary major replacements and improvements to those facilities.
- Market project power in accordance with authorizing legislation to achieve widespread benefits at lowest rates consistent with sound business principles and repayment requirements.
- Continue full utilization of Eklutna Project energy and peaking capability; optimize utilization of present firm energy from the Snettisham Project pending completion of the Crater Lake Unit.
- Enhance public use of project lands and facilities for other purposes, including visitations, reservoir recreation, fisheries development and municipal water supply.
- Limited planning efforts with priorities directed to timely construction of the Crater Lake Unit, maintenance of supporting statistical work, and evaluation of interconnection alternatives in Southeast Alaska.
- Encourage non-Federal development of hydro and other renewable energy resources where feasible and environmentally sound.

Accomplishment of these objectives will result in Alaska Power Administration meeting its responsibility of operations, maintenance, and power marketing for the two Federal hydroelectric projects in Alaska, and contribute significantly to longer-term renewable resources objectives.

Alaska Power Administration is responsible for operation, maintenance, and power marketing for two Federal hydroelectric projects in Alaska. The operating projects are the 30,000-kW Eklutna Project near Anchorage and the 47,160-kW Snettisham Project near Juneau. Project facilities include dams, reservoirs, powerplants, transmission systems and necessary maintenance facilities. Power is marketed at wholesale to five Alaskan utilities. The projects represent a current Federal investment of $112,000,000 and a replacement value in excess of $250,000,000.

Program objectives in operating, maintaining, and marketing power from Eklutna and Snettisham are:

- Maximize energy production, provide reliable service to customers, and minimize long-term costs while protecting the Federal investment.
- Market project power in accordance with authorizing legislation; continue full utilization of Eklutna energy and peaking capability; expand Snettisham capability within present authorization by adding Crater Lake Unit and Long Lake dam by 1986-1988; cooperate with customers in effort to minimize hydroelectric energy deficits in the Snettisham market area pending completion of the expansion.
- Continue to enhance public use of project lands and facilities, including visitations, reservoir recreation, and cooperation with Alaska Department of Fish and Game in salmon production program at Snettisham Project. Continue cooperation with Cook Inlet Aquaculture Association toward development of similar facility at Eklutna. Continue cooperation with Anchorage on its Eklutna water supply project.

The FY 1984 budget request includes $2,044,000 for the normal, continuing operation, maintenance, and marketing functions, and $425,000 in one-time appropriations for the following activities:

- Replace operation events recorder at Snettisham powerplant and Thane Substation for $30,000. Existing recorder is worn out and spare parts are not available.
- Replace 1970 model 980 front-end loader at the Snettisham Project for $200,000. The 14-year-old loader--purchased from construction contractor in 1973--has reached end of service life and annual repair costs are increasing. The 980 loader is used primarily for removing heavy winter snow. Snettisham has annual snowfall of about 25 feet.
- Vehicle replacements of one line truck and one pickup truck for age, mileage and condition at Eklutna Project are estimated at $30,000.
- Remove and salvage 16 aluminum towers on Salisbury Ridge (old section of Snettisham transmission line). These structures have an estimated replacement value of $400,000, and would be stored and used as replacements for existing transmission line. This section of line has been out of service since 1976, with minimal maintenance to preserve the structures until they can be salvaged. The actual salvage has been deferred because of higher priority maintenance items. Because of extreme weather conditions, the deferral involves significant risk (one structure on this portion of the line was destroyed during the 1981-1982 winter--apparently because of extreme wind). Estimated costs for the salvage is $165,000, most of which is for helicopter time.

Staffing for operation and maintenance program in FY 1984 is 26 FTE.

The request provides minimal funds for completing an orderly phase out of planning programs covering utilization of APA project power supplies and providing assistance in specific non-Federal power development initiatives. Priorities for the work include supporting studies for the Crater Lake Unit of Snettisham Project, evaluations of Southeast Alaska interconnection options and supporting load forecasts, and electric power statistics programs.

The request includes 2 FTE for completing an orderly phase out of this program.

Program Direction covers costs of Administrator's Office, public information programs, all overhead costs for APA headquarters' office, and the full range of administrative and management services in support of the power operation, maintenance, and marketing programs. The work includes program, budget, finance, accounting, personnel management, property management, procurement, contract administration, telecommunications, typewriters and other office equipment, computer services, and mails and files.

Commercial audit of FY 1983 operations is scheduled in early FY 1984.

Staffing for Program Direction is 10 FTE.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Power Marketing - Alaska Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Operation & Maintenance ..	$1,987	$2,657	$2,657	$2,469
General Investigations ...	893	640	640	100
Program Direction	658	648	648	641
Total, Alaska Power Administration	$3,538	$3,945	$3,945	$3,210
Staffing FTP/Total FTE's	36/43	32/36	32/36	34/38

Authorization: Section 302, Public Law 95-91

Summary of Changes

FY 1983 Appropriation	$3,945
FY 1984 Base	$3,945
Program increases and decreases:	
Reduce unobligated carryover excess to program needs	-836
Complete construction of Eklutna Office Space	- 30
Purchase D-7 bulldozer	-200
Preventive maintenance program on Snettisham transmission line	-120
Reduction of General Investigations Program	-200
Purchase events recorder	+ 30
Purchase 980 front-end loader	+200
Vehicle replacements	+ 30
Salisbury Ridge removal	+165
Increase in program direction expenses	+ 19
Other increases, including salaries	+207
FY 1984 Budget Request	$3,210

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Key Activity Summary

Alaska Power Administration
(in thousands of dollars)

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Operation and Maintenance	Total operation, maintenance, and marketing expenses, including the following one-time items-- --Snettisham bulldozer replacement. --Complete Eklutna Office building. --Snettisham transmission line preventive maintenance program. --Snettisham shunt reactor design and cost study.	Total operation, maintenance, and marketing expenses, including the following one-time items-- --Purchase 980 front-end loader. --Salisbury Ridge line removal. --Snettisham event recorder replacement. --Emergency fund
General Investigations	General investigations support expenses.	General investigations support expenses.
Program Direction	Maintenance of base management and support program.	Maintenance of base management and support program.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS

Alaska Power Administration

(In thousands of dollars)

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Estimate
Generating capacity:			
Installed capacity (KW)	77,160	77,160	77,160
Leasing capacity (KW)	--	--	--
Peak capacity (KW)	77,160	77,160	77,160
Generating stations:			
Generating projects (No.)	2	2	2
Substations/switchyards (No.)	5	5	5
Substations/switchyards (KVA capacity)	237,000	237,000	237,000
Available energy:			
Energy generated (megawatt-hours)	326,000	368,290	389,390
Energy purchased (megawatt-hours)	--	--	--
Energy available for marketing (megawatt-hours)	294,000	315,000	330,000
Transmission lines (circuit miles):			
115 KV	60	60	60
138 KV	42	42	42
Total circuit miles	102	102	102
Revenues:			
Annual gross power revenues[a/]	$ 4,053	$ 4,391	$ 4,898
Prior year adjustments	--	--	--
Total power revenues	$ 4,053	$ 4,391	$ 4,898
Annual gross revenues:	$ 4,053	$ 4,391	$ 4,898
Federal investment allocated to commercial power:			
Generation equipment	$ 82,526	$ 82,526	$ 82,526
Transmission facilities	$ 30,066	$ 30,066	$ 30,066
Total investment	$ 112,592	$112,592	$112,592

[a/] Includes power sales, wheeling, and other revenues.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED OR EXCHANGED BY PROJECT

Alaska Power Administration

Project	State	No. of Plants	Installed Capacity (KW)	FY 1982 Actual Power (GWH)	FY 1983 Estimated Power (GWH)	FY 1984 Estimated Power (GWH)
Power Marketed						
Eklutna	Alaska	1	30,000	164	164	164
Snettisham	Alaska	1	47,160	130	151	166
Total, power marketed		2	77,160	294	315	330
Power Wheeled and Exchanged						
Eklutna	Alaska	1	13	47	47	47
Total Power Wheeled and Exchanged		1	13	47	47	47

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Pending Litigtion

Alaska Power Administration

NONE

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

BONNEVILLE POWER ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Bonneville Power Administration Fund

[Sec. 115. Notwithstanding any other provision of this joint resolution, except section 102, expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454, are approved for construction of Boundary Integration and Colville Valley Support; official reception and representation expenses in an amount not to exceed $2,500; and for the purposes of providing funds for conservation and renewable resource loans and grants as specified in the Pacific Northwest Electric Power Planning and Conservation Act (Public Law 96-501), $1,250,000,000 borrowing authority is made available to remain outstanding at any given time: Provided, That the obligation of such additional borrowing authority not exceed $276,000,000 in fiscal year 1983.]

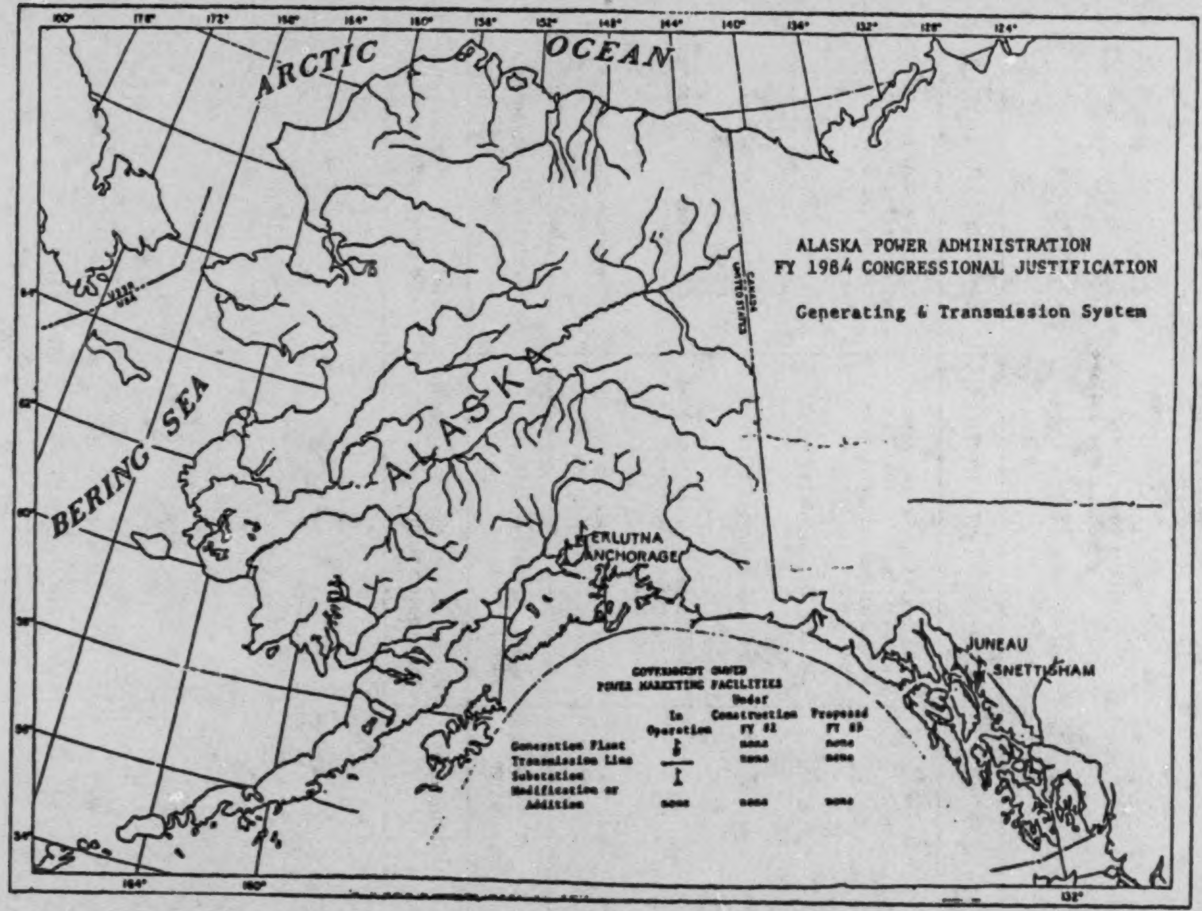
Expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454, are approved for official reception and representation expenses in an amount not to exceed $2,500; and for continuity of financing the construction program as well as financing new programs an additional $1,250,000,000 borrowing authority is made available under the Federal Columbia River Transmission System Act (Public Law 93-454) to remain outstanding at any given time.

During Fiscal Year 1984 and within the resources and authority available, gross obligations for the principal amount of direct loans shall not exceed $10,000,000.
During Fiscal Year 1984, commitments to guarantee loans may be made only to the extent that the total loan principal, any part of which is to be guaranteed, shall not exceed $10,000,000.

16 U.S.C. 825s, 832; 43 U.S.C. 389, 485a, 485h(c), 485i; 59 Stat. 10, 21-22; Public Law 93-454; Public Law 96-501.)

Explanation of Change

Proposed language replaces provisions contained in the FY 1983 continuing resolution.



ALASKA POWER ADMINISTRATION
FY 1984 CONGRESSIONAL JUSTIFICATION

Generating & Transmission System

ARCTIC OCEAN
BERING SEA
ALASKA
USSR
USA
CANADA
UNITED STATES
EKLUTNA
ANCHORAGE
JUNEAU
SNETTISHAM
GOVERNMENT OWNED POWER MARKETING FACILITIES
In Operation
Under Construction FY 83
Proposed FY 84
Generation Plant
Transmission Line
Substation
Modification or Addition
none
180°
176°
172°
168°
164°
160°
156°
152°
148°
144°
140°
136°
132°
128°
124°

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

BONNEVILLE POWER ADMINISTRATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6	1	1	1
ES-5			
ES-4	3	3	3
ES-3	3	3	3
ES-2	4	4	4
ES-1	1	1	1
SUBTOTAL	12	12	12
GS-18			
GS-17			
GS-16			
GS/GM-15	35	34	34
GS/GM-14	102	102	102
GS/GM-13	266	260	269
GS-12	483	483	536
GS-11	380	380	407
GS-10	33	27	30
GS-9	305	197	206
GS-8	61	60	65
GS-7	185	161	171
GS-6	122	113	114
GS-5	233	239	245
GS-4	160	170	174
GS-3	46	26	27
GS-2	6	3	3
GS-1			
SUBTOTAL	2,417	2,255	2,383
UNGRADED	1030	1050	1030
TOTAL PERMANENT POSITIONS	3,459	3,317	3,425
UNFILLED POSITIONS, END OF YEAR			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	3,459	3,317	3,425

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

PROGRAM OVERVIEW
OF PROGRAM SITUATION AND FY 1984 BUDGET

Introduction

Bonneville Power Administration (BPA) is the Federal electric power marketing agency in the Pacific Northwest, a 300,000-square-mile service area that encompasses Oregon, Washington, Idaho, and western Montana. BPA markets hydroelectric power from 30 U.S. Army Corps of Engineers and U.S. Bureau of Reclamation projects, as well as thermal energy from non-Federal generating facilities in the region. BPA markets and exchanges electric power interregionally over the Pacific Northwest-Pacific Southwest (PNW-PSW) Intertie, and in Canada over interconnections with utilities in British Columbia.

BPA constructs, maintains, and operates the nation's largest high-voltage transmission system grid (over 13,000 circuit-miles of line and 363 substations at the end of Fiscal Year 1982). This permits the coordination of the Federal electric power program with the region's public and investor-owned utilities to obtain the operating economies and investment benefits of a single regionwide utility.

Public Law 93-454, the Federal Columbia River Transmission System Act of 1974 (Transmission Act), placed BPA on a self-financed basis and brought it under the provisions of the Government Corporation Control Act, giving BPA the flexibility necessary to fulfill its regional utility mission in a businesslike manner. BPA has ongoing "revolving fund" authority to finance its operations with revenues from its power sales. Rates to generate these revenues are set after extensive public hearings in which all parties closely scrutinize program cost data. BPA's construction and conservation programs are financed with funds borrowed from the U.S. Treasury. In exchange for continuity of funding and the autonomy provided by the provisions of the Transmission Act, the region's ratepayers pay market rates for borrowing.

With the passage in 1980 of Public Law 96-501, the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act), BPA's utility-like role and responsibilities were greatly expanded. The Administrator is now responsible for meeting the net firm load growth of the region, and has authority to invest in regionwide energy conservation and to acquire resources as principal energy sources to meet these requirements. Other areas in which BPA acquired a far greater role under the Regional Act include enhancement of fish and wildlife, public involvement, and power exchanges with investor-owned utilities.

BPA's Fiscal Year 1983 budget was the first one formulated entirely under the provisions of the Regional Act, and it exhibited a marked change in program priorities and budget requirements. During FY 1982 BPA top managers participated in a long-range planning effort through which BPA's strategic direction was defined and priorities for critical action were established. This Fiscal Year 1984 budget represents a refinement and further development of the many new programs mandated by the Regional Act, and reflects top management's commitment to position BPA strategically to best fulfill its new role in the region's energy arena.

Purpose and Objectives

BPA acts as a catalyst for the achievement of electric energy objectives of the Pacific Northwest, as directed by Congress in the Regional Act. BPA works to assure the region an adequate, economical, reliable, efficient, and environmentally acceptable power supply. In accomplishing this, BPA operates in an open and businesslike way, consistent with its responsibilities as a Federal enterprise, and is responsive to the public's concern for general and economic well-being and the quality of the environment.

To achieve its goals and objectives under this mission, BPA will carry out the following programs during FY 1984:

1. Resource Planning, Acquisition, and Oversight: The orderly planning, acquisition, and oversight of reliable, cost-effective, environmentally acceptable resources, including resources purchased prior to the Regional Act, which are needed to serve BPA's portion of the region's forecasted net electric load requirements which cannot be met through cost-effective conservation.

2. Energy Conservation: The assessment of the potential for conservation and the development and implementation of cost-effective measures which will reduce BPA's obligation to serve the loads of its customers.

3. System Planning and Construction: The planning, design, and construction of a safe, reliable, efficient transmission system to enable BPA to maintain reliable, economic service to customers, provide transmission capacity for new generation, reduce transmission losses, meet load growth, and provide transmission capacity for wheeling and energy exchange.

4. Operation and Maintenance: The operation and maintenance of BPA's transmission system; power management activities, including power scheduling, rate design, and the negotiation of power sales contracts; the mitigation of the adverse impacts of power operations on the fish and wildlife resources of the Columbia River and its tributaries; and funding for the Pacific Northwest Electric Power and Conservation Planning Council established by the Regional Act.

5. Reimbursable: The acquisition of energy or the provision of other services by BPA under various trust and reimbursable arrangements, for which BPA is fully paid by benefiting entities.

6. Interest Expense and Associated Project Costs: Interest Expense includes the funding required to pay interest expense on Federal borrowings for the construction program and energy conservation investments. Associated Project Costs includes payments to the U.S. Treasury for U.S. Bureau of Reclamation and U.S. Army Corps of Engineers operation and maintenance of the Federal Columbia River Power System (FCRPS), and interest and amortization of U.S. Bureau of Reclamation projects.

Long-Range Power Outlook

Historically BPA has participated in the long-range load forecasting of the Pacific Northwest Utility Conference Committee, which has had the prime responsibility for forecasting loads in the Pacific Northwest. In recent years, this task has become more crucial and more controversial because small changes in load growth projections affect multi-billion dollar decisions.

With passage of the Regional Act, Congress established the preparation of a 20-year load forecast as one of the responsibilities of the Northwest Power Planning Council. The first such forecast is expected by April 1983. While this will be the region's premier load forecast, BPA's operational requirements and expanded responsibilities under the Regional Act make it essential that BPA develop independent detailed forecasts of power needs. Accordingly, BPA completed its first independent load forecast in 1982 which will provide BPA with a basis for making key decisions with respect to conservation, renewable and other resource acquisitions, import/export of electric energy and capacity, and in designing strategies for operating the region's hydroelectric reservoirs to accommodate week-to-week power requirements.

BPA's first load forecast indicates an average annual rate of growth of the region's energy requirements of 1.6 percent per year from 1980 until the year 2000. This forecast is compatible with the mid-point in growth rate assumptions currently being used by other entities in the region and is dramatically lower than the projections of 6 percent per year load growth upon which the region's planning was based a decade ago. To a large extent, the decline in projected load growth is due to the region's sluggish economy and programmatic as well as price-induced conservation. The difficulty in establishing reliable load forecasts is a problem jointly faced by BPA, the Regional Council, and other utility planners in the region.

BPA's current energy forecast indicates that the region will likely have energy surpluses until 1989. Until very recently, BPA's main focus in planning and marketing was to obtain sufficient resources to meet projected deficits. With the markedly reduced growth rate, however, the focus has shifted to holding down the projected surplus and marketing the remaining surplus efficiently and equitably. Accordingly, BPA recommended that the Washington Public Power Supply System delay construction on its Project No. 1 for up to 5 years. BPA has also limited its resource acquisition program. It has developed a Near-Term Resource Policy Statement to frame its consideration of acquisition proposals. The policy focuses BPA's attention in the near term on resources which minimize BPA cash-flow requirements in excess of the incremental revenue BPA receives from surplus power sales and meet other criteria which support the acquisition as a prudent action in the best long-term interests of the ratepayers. Because of the region's projected long-term power needs, the forecasting uncertainties, and the desirability of having additional resources near at hand in the event of changes in the load forecast, BPA's conservation and acquisitions programs will continue during the period of surplus although focused on meeting long-term deficits. These programs are valuable unfinished resources already committed to the region and could be brought on line in a relatively short time if there are unexpected shifts in the loads.

Energy Conservation

Under the Regional Act, BPA is required to treat conservation as the region's highest priority resource and is authorized to undertake a comprehensive regional energy conservation program. Since passage of the Regional Act, BPA has developed and offered such conservation programs to the region's utilities as residential weatherization, water heater insulation, and street lighting. Through cooperative agreements with Northwest State energy offices, BPA also provides funds for local government energy planning, assessment of local energy resources, extension services for energy-users, and technical assistance for local governments to help with projects such as management of facilities to increase energy efficiency. Through pilot programs, BPA has begun to test the potential for small wind energy and the effectiveness of solar water heating in the region. Conservation programs are expected to achieve approximately 171 annual average megawatts in FY 1984, in addition to 152 annual average megawatts achieved in FY 1983.

Substantial increases are expected in FY 1983 and FY 1984 in BPA's ongoing conservation programs. Over 100 of the region's publicly owned utilities have signed contracts with BPA to implement the regionwide programs, and the region's investor-owned utilities are now eligible to participate as well. Consumer requests for BPA-assisted weatherization services have exceeded expectations in many utility service areas, and the demand for such services is expected to increase further as a result of BPA's FY 1983 wholesale rate increase. BPA may need to increase its conservation program borrowing estimate for FY 1983 if recent preliminary utility estimates of funding requirements prove to be accurate.

BPA is developing and implementing additional conservation programs consistent with its proposed Near-Term Resource Policy. Under this policy, BPA would continue as originally planned with programs already implemented and would initiate those conservation programs which would minimize rate increases, require several years from start-up to achieve targeted energy savings, and save energy mainly during the period of forecasted power deficits. In addition, BPA is preparing to reduce future power deficits by stressing the development of pilot programs to test delivery and financing options so as to have proven mechanisms available for achieving targeted conservation by the 1990's.

BPA plans to fund a substantial portion of its conservation program through external financing mechanisms during FY 1984. This external financing would supplement funds available through Treasury borrowing and from BPA's own revenues. Several different financing mechanisms are being considered as sources for the necessary funds.

EPRI Support

In response to expressed concerns by customers over the previously planned increases in the level of BPA's financial participation in the research and development activities of the utility industry's Electric Power Research Institute (EPRI), this budget continues the FY 1982 funding level of $7.7 million in each of FY 1983 and 1984. This is below the full participation level of funding that would result from application of the EPRI formula.

Washington Public Power Supply System Oversight

Through net-billing agreements, BPA has contracted to acquire the capability of three nuclear power plants--Projects 1, 2, and 3--being constructed by the Washington Public Power Supply System (Supply System) in Washington State. BPA has acquired the entire capability of two plants and 70 percent of the third plant. The Supply System was also constructing two other nuclear power plants, prior to their termination in early 1982. BPA had no involvement in these nuclear power plants--Projects 4 and 5. Projects 1 and 4 and Projects 3 and 5 were being constructed as twin units.

Cost estimates for Supply System projects have increased considerably since the original estimates, due primarily to inflation, high interest rates for borrowings, and construction schedule delays. BPA is obligated to pay debt service on the bonds sold to finance construction of Projects 1, 2, and 3. The direct relationship between the expense of these thermal plants and BPA's rates has prompted the Administrator to work closely with the Supply System to place special emphasis on steps to reduce the costs associated with the Supply System projects.

On April 19, 1982, BPA's Administrator recommended to the Supply System Board of Directors that they extend completion of Project 1 up to 5 years. This recommendation was made following extensive analysis of complex financing and power supply issues by BPA staff. On May 28 the Board adopted a plan for implementing the construction extension. That plan was revised by the Supply System at the direction of its Executive Board in October 1982. The revised plan provides for no specific restart activities in the near future.

Since early 1982 the Supply System has concentrated its efforts on the completion and operation of Project 2 by February 1984 and on the construction and financing activities necessary to complete Project 3 within budget and on schedule. Major milestones were reached on Project 2 with completion of the cold hydrostatic test of the reactor pressure vessel on August 27, 1982, and the integrated flush of the vessel fuel pool and systems on November 12, 1982. These tests verify the integrity of the reactor pressure vessel and associated piping and fulfill a necessary Nuclear Regulatory Commission licensing requirement. Testing and start-up activities continue to support the schedule for commercial operation of the reactor by February 1984, although the schedule is acknowledged to be a tight one.

At Project 3, construction progress and productivity have exceeded the scheduled levels for the last 13 months in support of the commercial operation date of December 1986. The project was approximately 66 percent complete at the end of November 1982.

Initiative 394: On November 3, 1981, Washington State voters approved Initiative No. 394. The new law, which took effect on July 1, 1982, provided that no public agency could issue or sell bonds on or after that date to finance the construction costs of certain electric generating facilities, including the net-billed Supply System projects, unless it first obtained the approval of a majority of the voters of the public agency or, in the case of joint operating agencies such as the Supply System, the voters of the local government agencies comprising the membership of the joint operating agency.

On December 4, 1981, the Bond Fund Trustees for Projects 1, 2, and 3 initiated a lawsuit against the State of Washington and certain officials thereof, alleging the unconstitutionality of Initiative No. 394 on several counts. On April 9, 1982, the U.S. Department of Justice initiated a similar lawsuit challenging the constitutionality of Initiative No. 394, asserting certain rights and interests of BPA and its ratepayers. On June 29, 1982, Judge Tanner of the United States District Court, Western District of Washington, declared Initiative No. 394 unconstitutional as it specifically related to

Supply System Projects 1, 2, and 3. He delayed the effective date of that decision until April 15, 1983, to allow sufficient time for appeals. An appeal has been filed in the Ninth Circuit Court. Oral agreements were heard in the North Circuit Court in November 1982.

Colstrip Transmission Facilities

BPA has been working with the State of Montana regarding a number of concerns about the construction of the Colstrip transmission facilities. BPA undertook the planning and development of these transmission facilities as a result of a 1977 request from the Montana Power Company and other participants in the Colstrip Generating Unit Nos. 3 and 4. BPA accepted this responsibility on the basis of existing authority under the Transmission Act and in response to a congressional action in October 1978, which provided for the construction of facilities to integrate the Colstrip generation into the BPA transmission grid.

Colstrip Units 3 and 4 have figured prominently in every analysis of resource and transmission requirements made by BPA in recent years. The Colstrip output, a significant portion of which will go to consumers in Montana, is needed to meet energy deficits in the 1990's. Recent discussions between the Western Area Power Administration (WAPA) and BPA have focused on utilization of the Colstrip transmission to permit exchanges and sales of power between WAPA and BPA, thereby increasing the efficiency of both the Columbia and Missouri hydrosystems.

In response to specific concerns voiced by Montana citizens, elected officials, and governmental entities with respect to the Colstrip projects, BPA has taken a number of steps. In order to provide accessibility to more persons actually affected by the Colstrip lines, BPA moved the Montana District Office from Kalispell to Missoula. In addition, BPA recently established an office in Helena. A periodic newsletter and numerous public meetings have greatly facilitated communication between BPA and the citizens of Montana.

BPA has also made a significant number of substantial routing changes, and has worked to develop a partnership with a number of Montana State boards and agencies involved in the evaluation and siting of transmission facilities. Most recently BPA collaborated with the State of Montana in drafting a Memorandum of Understanding which went into effect August 31, 1982. Based on this understanding, BPA will continue to work with Montana to resolve mutual concerns in an equitable manner, while proceeding with the timely and efficient completion of the Colstrip transmission facilities.

The total Colstrip transmission facilities from Townsend, Montana, to Spokane, Washington, is composed of both the Western Montana Transmission (Budget Item 101) and Hot Springs-Bell (Budget Item 185) in the budget. Revised energization dates of October 1985 for Budget Item 101 and October 1986 for Budget Item 185 were reported in last year's budget presentation to the Congress. The revised dates were necessary to allow BPA time to consider additional alternative routes for the portion of the facility between Garrison, Montana, and Spokane, Washington. Alternatives which are being considered may substantially increase the costs for the Colstrip transmission facilities. These costs will be reported after the Garrison-Spokane route is selected and a Record of Decision is made in 1983. The revised costs may well require a modification of BPA's FY 1983 and FY 1984 budgets.

Impact Aid

The Regional Act authorized BPA to make impact-aid payments to local governments related to the construction of "major transmission facilities," in accordance with certain legislative constraints. These payments may be made beginning in the first fiscal year after the Northwest Power Planning Council adopts its regional power plan and fish and wildlife program. BPA has issued a proposed impact-aid formula and is reviewing it for anticipated implementation in FY 1984. The proposed formula contemplates advance payments to local governments. No provision for payments is made in this budget. If appropriate, BPA will propose an adjustment to the FY 1984 budget to implement the impact-aid payments.

ADP Management

During the past year, BPA has made substantial progress in carrying out recommendations made by the BPA-DOE study team for improved ADP management. The newly created Division of Information Services has worked closely within BPA to develop an initial set of common goals, policies, and procedures for a consolidated information management program.

BPA's ADP management is actively pursuing two avenues to achieve its emerging program. First, BPA is replacing its 13-year-old general-purpose mainframe computer. Vendors' initial proposals were received in early August. The final proposals were received on November 16, 1982. Technical evaluations, cost analyses, and evaluation of cost proposals were completed in mid-December 1982. Following clearance by DOE, BPA awarded the contract December 30, 1982. Installation of equipment should begin within 90 days.

Second, the Division of Information Services is developing a planning methodology which, among other things, will give priority to computer application proposals demonstrating the strongest linkage to BPA's long-term strategic choices. BPA expects to employ this planning methodology by the end of FY 1983.

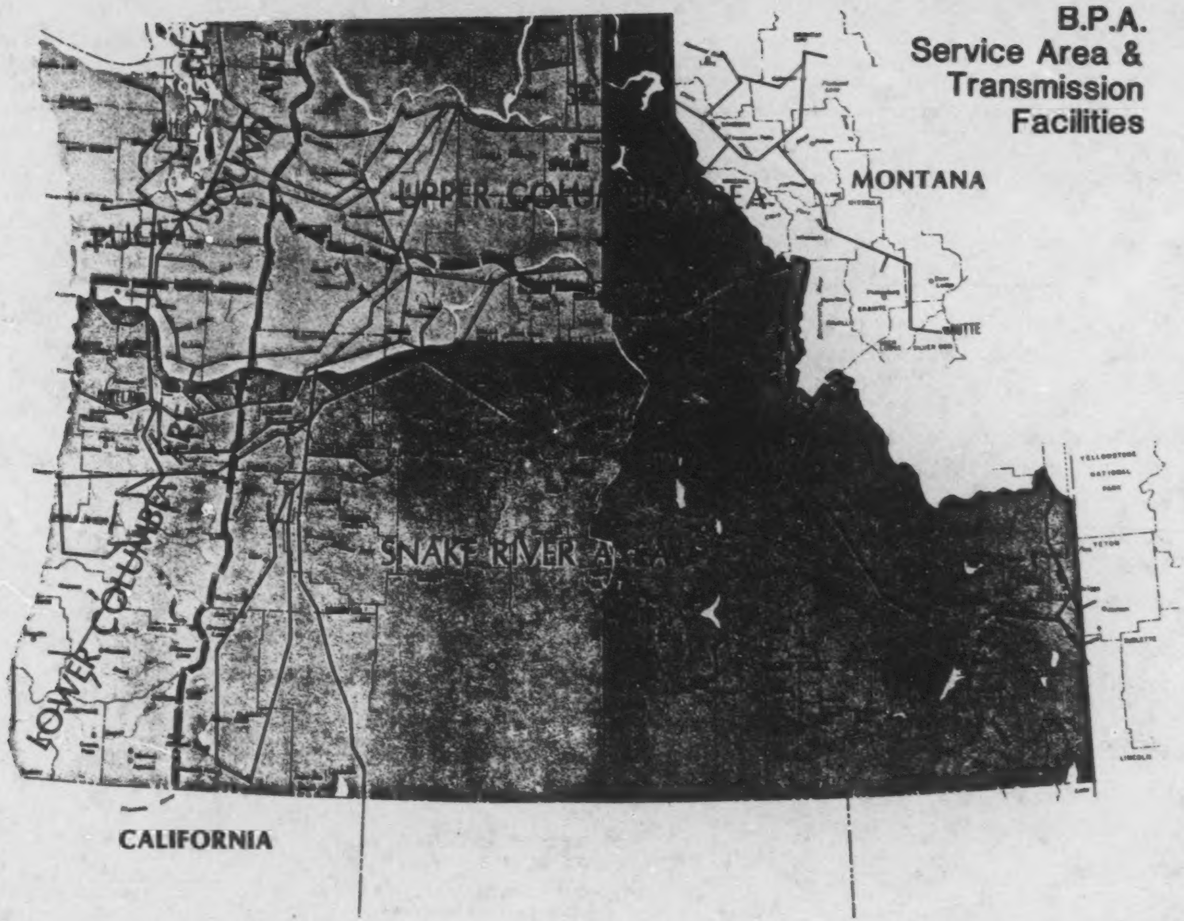
Northwest Power Planning Council

The Northwest Power Planning Council established pursuant to the Regional Act adopted its fish and wildlife program on November 15, 1982. The Regional Act states that the BPA "Administrator shall use the Bonneville Power Administration fund and the authorities available to the Administrator under this Act and other laws . . . to protect, mitigate, and enhance fish and wildlife to the extent affected by the development and operation of any hydroelectric project of the Columbia River and its tributaries in a manner consistent with the . . . (fish and wildlife) program adopted by the Council." The Act further provides that "the Administrator and other Federal agencies responsible for managing, operating, or regulating Federal or non-Federal hydroelectric facilities located on the Columbia River or its tributaries shall . . . exercise such responsibilities, taking into account at each relevant stage of decisionmaking processes to the fullest extent practicable, the (fish and wildlife) program adopted by the Council."

The adopted fish and wildlife program contains provisions which will have significant impact on BPA's revenue requirements. For example, the program recommends a "water budget" to provide increased flows to improve the survival of juvenile salmon. The effect of the water budget would be to reduce the firm energy generating capability of the hydroelectric facilities of the Columbia River system (by increasing the amount of water to be released from storage during April-June, thereby reducing the amounts available for release later in the year when it is needed to serve firm loads). The water budget is expected to result in a 550 average megawatt "derating" of the firm generating capability of the system. Even with the generating surplus the region temporarily enjoys, the levelized revenue requirement to provide this water budget is conservatively estimated to be $160 million per year from now until the year 2000 (these calculations are hypothetical; actual financial impacts can only be established through BPA's future wholesale rate proceedings). Other elements of the Council's plan provide for improvements in upstream migration of adult salmon, increases in natural and artificial fish production, and the production and protection of resident (nonmigratory) fish.

The Council is not expected to adopt its regional conservation and electric power plan until late April 1983. Until that plan is adopted, its contents are speculative and prospective. Relatively modest financial requirements are reflected in this FY 1984 budget for implementation of the adopted fish and wildlife program and the regional power plan. After the Council adopts its power plan, and after BPA has had an opportunity to assess it, meet necessary NEPA and other procedural requirements, and take them "into account to the maximum extent practicable," it may be necessary for BPA to revise its budget for FY 1984 to reflect the costs which implementation of the Council's fish and wildlife program and the regional power plan will entail.

B.P.A. Service Area & Transmission Facilities


MONTANA
PUGET SOUND AREA
UPPER COLUMBIA AREA
LOWER COLUMBIA AREA
SNAKE RIVER AREA
BUTTE
YELLOWSTONE NATIONAL PARK
TETON
SUBLETTE
LINCOLN
CALIFORNIA

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

PROGRAM AND FINANCING SUMMARY
Fiscal Years 1982 through 1988
($000)

PROGRAMS

	FY 1982		FY 1983		FY 1984		FY 1985	FY 1986	FY 1987	FY 1988
	Oblig.	Outlays	Oblig.	Outlays	Oblig.	Outlays	Outlays	Outlays	Outlays	Outlays
Resource planning, acquisition, and oversight	929,292	921,325	1,373,700	1,373,700	1,837,800	1,837,800	2,243,900	2,714,700	3,152,000	3,514,700
Energy conservation 1/	64,682	61,350	253,500	253,500	145,100	148,000	165,800	145,200	148,900	153,500
System planning and construction	209,538	161,850	218,700	218,200	216,900	223,400	229,500	216,000	183,500	238,000
Operation and maintenance	102,068	99,391	129,000	129,000	163,200	163,200	170,900	184,200	196,600	209,800
Reimbursable	96,270	95,225	88,500	88,500	95,400	95,400	97,900	100,600	103,300	106,100
Interest	85,526	75,721	109,900	109,900	155,900	155,900	209,700	253,700	291,900	342,100
Associated project costs	78,973	59,384	91,900	91,900	100,000	100,000	106,300	113,000	119,600	126,600
Total programs	1,566,349	1,474,246	2,265,200	2,264,700	2,714,300	2,723,700	3,224,000	3,727,400	4,195,800	4,690,800
FINANCING										
	Accrued Revenue	Cash Receipts	Accrued Revenue	Cash Receipts	Accrued Revenue	Cash Receipts	Cash Receipts	Cash Receipts	Cash Receipts	Cash Receipts
Revenues from operation	1,324,766	1,317,100	2,155,300	2,125,300	2,718,800	2,688,800	3,243,600	3,614,100	4,158,900	4,559,900
Reimbursable	103,856	100,753	88,500	88,500	95,400	95,400	97,900	100,600	103,300	106,100
Subtotal, revenues & other receipts	1,428,622	1,417,853	2,243,800	2,213,800	2,814,200	2,784,200	3,341,500	3,714,700	4,262,200	4,666,000
NET OBLIGATIONS/OUTLAYS										
	137,727	56,393	21,400	50,900	-99,900	-60,500	-117,500	12,700	-66,400	24,800

Note: Net obligations equal program obligations less accrued revenues; net outlays equal program outlays less cash receipts.

1/ Does not include the following amounts assumed to be financed externally: 32.9 million in FY 1983; 193.9 million in FY 1984; 308.1 million in FY 1985; 89.2 million in FY 1986; 105.1 million in FY 1987; 132.5 million in FY 1988. Debt service on these is included in interest expense.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SOURCE AND APPLICATION OF FUNDS AND STATUS OF BORROWING
Fiscal Years 1982 through 1988

STATUS OF BPA FUND
($000)

	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Beginning cash balance	50,308	84,309	90,000	90,000	90,000	90,000	90,000
Revenues and other receipts	1,417,853	2,213,800	2,784,200	3,341,500	3,714,700	4,262,200	4,666,000
Receipts from borrowing	210,000	464,500	341,200	346,000	332,000	299,000	353,000
Total BPA Receipts	1,678,161	2,762,609	3,215,400	3,777,500	4,136,700	4,651,200	5,109,000
Ending cash balance	84,309	90,000	90,000	90,000	90,000	90,000	90,000
Program outlays	1,474,246	2,264,700	2,723,700	3,224,000	3,727,400	4,195,800	4,690,800
Capital transfer 2/	119,606	407,909	401,700	463,500	319,300	365,400	328,200
Total BPA Fund Commitments	1,678,161	2,762,609	3,215,400	3,777,500	4,136,700	4,651,200	5,109,000

STATUS OF BORROWING
($000)

	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Borrowing authority	275,570	455,000	324,500	348,500	264,000	281,500	561,000
Cumulative borrowing	910,000	1,374,500	1,715,700	2,061,700	2,393,700	2,692,700	3,045,700

2/ Detail of capital transfer:

Amortization paid	--	81,720	221,900	287,500	147,200	193,200	155,900
BPA interest on appropriated debt and USCE interest due	164,341	174,000	179,800	176,000	172,100	172,200	172,300
Paid on deferal/deferred	-44,735	152,189	--	--	--	--	--
Subtotal of interest	119,606	326,189	179,800	176,000	172,100	172,200	172,300
Total capital transfer	119,606	407,909	401,700	463,500	319,300	365,400	328,200
Cum. deferred capital transfer	152,189	--	--	--	--	--	--

BPA's Fiscal Situation

FY 1982 Status: BPA completed the fiscal year with revenues approximately $250 million less than the anticipated revenues projected in the October 1981 rate filing.

There are several reasons for the lower revenues. Power sales were lower than projected because of the impact of the national economic recession on the Pacific Northwest and BPA. Reduction in residential and industrial electricity use, due primarily to the economy and price-induced conservation, has resulted in a substantial drop in revenue compared to original forecasts. These revenues could have been increased if BPA had been authorized to market the resultant surplus power on a firm basis outside the region.

FY 1983-84 Revenues: In order to meet substantially higher costs--especially for the Residential Exchange and the net-billing of Supply System costs--and to repay deferred interest and amortization of Federal investment to the Treasury, BPA filed a proposed wholesale power rate increase effective October 1, 1982. It was projected to bring BPA's total revenue to $2.2 billion in FY 1983. During FY 1983 BPA anticipates that it will file a proposal for a rate increase to become effective in FY 1984.

Repayment Status: Due to the revenue shortfalls, BPA deferred approximately $45 million in interest payments to the U.S. Treasury during FY 1982. This brought BPA's cumulative deferral to approximately $152 million as of September 30, 1982. BPA's new rates were designed to increase revenues in FY 1983 to a level sufficient to pay the total deferral and to plan for nearly $380 million in amortization payments during the 3-year period from FY 1983 through FY 1985.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET

LEAD TABLE

Bonneville Power Administration
(dollars in thousands)

	FY 1982	FY 1983	FY 1984 Request
Bonneville Power Administration			
Borrowing Authority	275,570	$455,000	$324,500
Staffing FTP/Total FTE's	3413/3637	3313/3542	3425/3651

Department of Energy
FY 1984 CONGRESSIONAL BUDGET

SUMMARY OF CHANGES

Bonneville Power Administration
(dollars in thousands)

	Borrowing Authority
FY 1983 Budget	$455,000
Program decreases:	
Decrease in the Transmission System Construction program	-2,000
Decrease in energy conservation program borrowings from the U.S. Treasury	-128,500
FY 1984 request	$324,500

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget
Bonneville Power Administration

Key Activity	Estimated Activities During FY 1983	PLANNED ACTIVITIES DURING FY 1984
Resource Planning, Acquisition, and Oversight	Develop improved load forecasting methodology.	Develop forecasts of power needs and resources.
	Fund preliminary studies and acquire information from sponsors' projects.	Award RD&D and preconstruction costs to resource project sponsors.
	Centralize thermal oversight.	Acquire the resources or options on resources necessary to meet the Administrator's load obligations; oversee acquired projects.
	Offer net transmission agreements to customers not involved in residential exchange.	
	Reimburse others for use of facilities and upstream storage benefits.	Continue to reimburse others for use of facilities and upstream storage benefits.
Energy Conservation	Test and carry out residential conservation programs.	Continue to test and carry out residential conservation programs.
	Investigate, test, and carry out programs to improve commercial and industrial sector electrical energy use.	Continue to investigate, test, and carry out programs to improve commercial and industrial sector electrical energy use.
	Test and carry out conservation programs for public agencies and customers.	Continue to test and carry out conservation programs for public agencies and customers.
System Construction	Analyze and plan the region's transmission system.	Continue to analyze and plan the region's transmission system.
	Conduct research and development.	Conduct research and development.
		Engineer and begin construction on 6 new transmission facility additions.

System Operation	Operate 371 substations.	Operate 377 substations.
	Meet power system control and dispatching requirements.	Continue to meet power system control and dispatching requirements.
	Investigate the transmission system's power and reactive flows and voltages, emergency operation programs, and substation manning standards; supervise operation of the system.	Continue to investigate the transmission system's power and reactive flows and voltages, emergency operation programs, and substation manning standards; supervise operation of the system.
System Maintenance	Maintain over 13,700 circuit-miles of transmission lines.	Maintain 14,000 circuit-miles of transmission lines.
	Maintain substation facilities and related equipment.	Continue to maintain substation facilities and related equipment.
	Maintain system protection and power system control equipment.	Continue to maintain system protection and power system control equipment.
	Provide buildings, grounds, and other maintenance services.	Continue to provide buildings, grounds, and other maintenance services.
Power Scheduling	Forecast the hourly power requirements of BPA customers and interchange of power with other utilities; schedule the Federal power to meet customer needs.	Forecast the hourly power requirements of BPA customers and interchange of power with other utilities; schedule the Federal power to meet customer needs.
Power Marketing	Develop and oversee contracts for power sales, exchange, conservation, wheeling, and billing credits.	Develop and oversee contracts for power sales, exchange, conservation, wheeling, and billing credits.
	Develop and carry out marketing policy.	Develop and carry out marketing policy.
	Develop power and wheeling rates.	Develop power and wheeling rates.
	Review customer utility retail rates and evaluate their rate structures.	Review customer utility retail rates and evaluate their rate structures.
	Apply transmission and customer service policies and develop customer service plans.	Apply transmission and customer service policies and develop customer service plans.
	Provide special coordination in the areas of energy management plans and public involvement.	Provide special coordination in the areas of energy management plans and public involvement.

Fish and Wildlife	Fund studies to implement the Planning Council's Columbia River Basin Fish and Wildlife Program.	Fund and oversee research, design, and development projects to improve survival of salmon and steelhead in the Columbia and to protect and enhance resident fish and wildlife.
Planning Council	Provide funding for the Pacific Northwest Electric Power and Conservation Planning Council.	Continue to provide funding for the Pacific Northwest Electric Power and Conservation Planning Council.
Reimbursable	Pay (and be reimbursed for) the investor-owned utilities' share of Hanford Generating Project costs; interruptible replacement energy for the direct-service industries; and construction, operation, and maintenance work done for others.	Pay (and be reimbursed for) the investor-owned utilities' share of Hanford Generating Project costs; interruptible replacement energy for the direct-service industries; and construction, operation, and maintenance work done for others.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET

SYSTEM STATISTICS
ENERGY PURCHASED, WHEELED, AND EXCHANGED
BONNEVILLE POWER ADMINISTRATION

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Estimate
Generating capacity: (USCE and USBR Plants in Federal Columbia River Transmission System)			
Number of projects	30	30	30
Installed capacity (kW)	19,052,480	19,425,780	20,579,780
Peak capacity (kW)	21,485,550	21,810,520	22,964,520
Substations:			
Number of substations	363	371	377
kVA capacity	57,518,621	59,474,221	61,004,721
Available energy: (MWh)			
Energy generated (USCE and USBR plants in Federal Columbia River Transmission System)	88,744,355	85,900,000	85,900,000
Energy purchased, wheeled, and exchanged (includes thermal plants)	76,580,645	80,000,000	84,000,000
Conservation	138,000	670,000	733,000
Energy available	165,463,000	166,570,000	170,633,000
Transmission lines: (circuit-miles)			
800 kV	265	265	265
500 kV	3,603	3,806	3,991
345 kV	709	709	709
287 kV	1,450	1,450	1,450
230 kV	3,600	3,787	3,890
138 kV	46	46	47
115 kV	3,408	3,392	3,363
Lower voltage	299	291	286
Total circuit-miles	13,380	13,746	14,001
Plant-in-service: ($ million)			
Transmission facilities (BPA) ...	2,333	2,520	2,700
Power generation facilities (USCE and USBR)	4,717	4,965	5,080
Total	7,050	7,485	7,780

Department of Energy
FY 1984 Congressional Budget Request

Narrative Justification
Bonneville Power Administration

Introduction

BPA's FY 1984 budget will require obligations of approximately $2.7 billion. Funding at that level will provide $1.8 billion for resource aquisitions, $145 million for energy conservation, $217 million for transmission system construction, $163 million for operation and maintenance, $156 million for interest expense, $100 million for associated project costs, and $95 million for reimbursable programs. Borrowing authority for transmission system construction and energy conservation in FY 1984 will be $324.5 million. BPA has forecast total full-time permanent employment (FTE) of 3,651 in FY 1984.

This budget requests an increase in the limitation on outstanding borrowing authority under the Transmission Act by $1.25 billion to provide continuity of financing original Transmission Act programs as well as financing flexibility provided under the Regional Act. The original borrowing authority, which was anticipated to fund transmission system construction for about 10 years, is expected to be exhausted by mid-1984, and must be replenished to continue funding of transmission construction over the next 5 to 10 years. This increase in BPA borrowing authority will require Congressional action to make the authority available to BPA.

Details concerning program objectives and the allocation of resources to accomplish those objectives are in the program narratives which follow.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

RESOURCE PLANNING, ACQUISITION, AND OVERSIGHT

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
1. Resource planning	7,165	9,930	9,990
2. Resource acquisitions under the Act	4,005	23,870	26,630
3. Resource oversight	708	700	680
4. Continuing acquisitions and power purchases			
a. Pre-Regional Act acquisitions			
(1) Hanford Generating Project	8,767	8,100	34,400
(2) Trojan Nuclear Plant	37,201	40,900	44,500
(3) WNP-1	159,097	197,300	201,300
(4) WNP-2	148,890	231,400	336,900
(5) WNP-3	40,000	186,400	221,600
b. Other continuing acquisitions	86,924	32,600	19,900
5. Residential power exchange	416,506	612,900	914,400
6. Use of facilities and upstream storage	20,029	29,600	27,500
Total	929,292	1,373,700	1,837,800

The Regional Act broadened the Administrator's obligation to meet the region's electric energy needs and expanded the authorities available to the Administrator to supply them. Sections 5(b) and 6(a)(2) of the Regional Act direct the BPA Administrator to supply the net firm power requirements of each requesting Pacific Northwest utility, including publicly owned systems, cooperatives, and investor-owned systems. In addition, BPA supplies power to its direct-service industrial (DSI) customers and to certain Federal agencies. In order to meet its power supply obligations, the Regional Act in Section 6(a)(2) grants the BPA Administrator the authority to acquire resources sufficient: (1) to meet the contractual obligations that remain after taking into account planned savings from the conservation measures and direct-application renewable resources described in Section 6(a)(1); and (2) to implement the fish and wildlife protection, mitigation, and enhancement activities directed in Section 4(h).

In response to that directive, BPA has established a Resource Planning, Acquisition, and Oversight program. This program is composed of BPA activities which are directed toward identifying, planning for, and meeting the Administrator's load obligations. This includes identifying the region's loads and resources, including those available to the Administrator; determining the Administrator's load obligations; and planning the orderly development and acquisition of resources to meet the forecast needs. The development and acquisition of resources includes a variety of approaches identified by the Regional Act: short- and long-term acquisitions under the Regional Act; short-term purchases under the authority of the 1974 Transmission System Act (P.L. 93-454); billing credits; preconstruction assistance; research, development, and demonstration projects to evaluate potentially cost-effective technologies; and other approaches intended to result in the most cost-effective mix of energy resources to meet the Administrator's obligations. The program also includes resource oversight activities, paticularly the construction oversight of the Supply System Plants 1, 2, and 3.

In addition to resource development and acquisition under the Regional Act, the program includes acquisitions made prior to its enactment. These include 100 percent of the capability of the Washington Public Power Supply System's (Supply System) Projects 1 and 2 and 70 percent of the capability of Project 3; the Eugene Water and Electric Board's 30 percent share of the Trojan nuclear plant; and the Hanford Generating Project. The commercial operation of the first Supply System project, Project 2, is planned for February 1984.

1. Resource planning $9,990,000

BPA, in cooperation with the Regional Council, has a responsibility under the Regional Act to plan for the orderly development of reliable, cost-effective, and environmentally acceptable electric power generating resources needed to serve the region's forecast net electric load. The Regional Council's 20-year forecast is the region's preeminent overall forecast of energy loads. However, BPA's operational requirements and expanded responsibilities under the Regional Act necessitate the development of independent detailed forecasts of power needs and the Administrator's load obligations as well as detailed forecasts for specific purposes such as rate setting, coordination agreement planning, and transmission planning. The Regional Act encourages BPA to meet the Administrator's load obligations with a potentially diverse mix of resources which are demonstrated to be cost-effective and which comport with priority requirements in Section 4(e)(1) and the considerations of Section 4(e)(2) of the Act. BPA has responded to these needs by improving its load forecasting capability and by the development of a least-cost mix analysis methodology which includes an assessment of those technologies having the greatest potential for widespread commercial application and subsequent integration into the power system. The FY 1984 request reflects the inclusion of load forecasting expenditures and the refinement of BPA's analytical capability to evaluate components of the load forecasts of available resources.

2. Resource acquisitions under the Regional Act $26,630,000

Although BPA's load forecasts indicate that the region will experience surplus until near the end of the decade, BPA nonetheless has a responsibility to plan to meet load during the anticipated deficit periods. Because of the lead times involved, resource development activities must go forward now to assure resources are available when they are needed. BPA has developed a Near-Term Resource Policy Statement to guide its resource acquisition decisions during this period of transient surplus of uncertain dimensions and of long-term forecasted deficits.

In this policy statement, BPA proposes to consider for acquisition those resources which minimize BPA cash-flow requirements in excess of the incremental revenue BPA receives from surplus power sales and meet other criteria which support the acquisition as a prudent action in the best long-term interests of the ratepayers.

The Acquisitions program is concentrated in six principal areas: (1) resource acquisitions (over 5 average megawatts); (2) small resource acquisitions (under 5 average megawatts); (3) billing credits; (4) preconstruction assistance; (5) options purchases; and (6) renewable resources RD&D.

a. Resource acquisitions $210,000

BPA plans to acquire certain selected resources which meet the criteria of the Near-Term Policy or which offer the opportunity to test program concepts and procedures on an initially limited scale before offering programs regionwide. BPA's general resource acquisitions program addresses resources over 5 average megawatts and is intended to encourage the development of resources which will be completed and benefit the region in the next decade. Although the program is directed toward the long-term, it preserves the Administrator's flexibility during a period of uncertainty by permitting selected acquisitions when BPA's analysis indicates their desirability. The program is predicated on cooperation with resource sponsors in the financing of resources, with the 1984 estimated cost of $210,000 reflecting approximately 35 percent of the total cost of the initial studies and engineering for projects are constructed, with project on-line dates timed to coincide with the need for power.

The reduction Resource Acquisition element of this program reflects a redirection of BPA's acquisition efforts toward long-term efforts to assure meeting future load. Resources already acquired by BPA are included in the Continuing Acquisitions component of the program.

b. Small resources $3,450,000

BPA's Small Resources program will assist in meeting the Administrator's load obligations through the acquisition of the output of small resources (under 5 average megawatts) purchased through utility sponsors. This program reflects BPA's efforts to promote diversity in available resources through establishing a predictable market for qualifying projects. This program will be offered to the region on a limited scale during FY 1983 and is expected to increase by $1,800,000 during FY 1984 as the utilities respond to the program.

c. Billing credits $4,390,000

Section 6(h) of the Regional Act states that, if a customer so requests, the Administrator "shall grant" a billing credit for qualifying resources "constructed, completed, or acquired" which reduce the Administrator's obligation to acquire other resources under the Regional Act. BPA has conducted a regionwide effort to develop a billing credits policy which is being programmatically implemented in FY 1983 at an estimated cost of $1,650,000 and which is expected to increase by an estimated $2,740,000 in FY 1984 due to the interest of the region's utilities in the program.

d. Preconstruction assistance $1,110,000

Sections 6(f)(1)(A) and (B) of the Regional Act permit the Administrator to fund or secure the debt of resource sponsors for the costs incurred in preconstruction investigations and initial development of nonmajor renewable resources and the investigation and preconstruction expenses of any resource, if the Administrator's failure to do so could be shown to work an inequitable hardship on the sponsor's consumers and if other specified criteria are met. BPA has interpreted the intent of that section as encouraging utilities to explore new resources without undue financial risk. BPA would assume the financial risk for the preconstruction expenses for qualifying projects and would reimburse sponsors for the preconstruction expenses for those projects which are not constructed.

BPA is formulating this program in light of its Near-Term Resource Policy and plans to direct its efforts toward proposals for resources which will be operational during the time they will be needed, after 1990. This program will implement the requirement of 6(f)(3) that agreements include an option for the Administrator to acquire the resource if constructed, or to recover the cost of advances if the resource is developed after the Administrator and the sponsor determine not to proceed with construction. The amount of $1,110,000 represents the liability incurred by BPA for projects investigated but not constructed.

e. Options $5,580,000

BPA, working with the Regional Council, the customers, and others, is exploring the use of options purchases as a means of ensuring meeting the Administrator's local obligation identified beyond the requirements of the base case load forecast. This approach would permit BPA to exercise options on resources which are available or which could be constructed to be available at the time they are needed and would offer a certainty of meeting load wthout the cost and risk associated with large-scale construction and outright acquisitions, preserving the Adminstrator's flexibility to deal with unanticipated fluctuations in the load.

f. Renewable resources RD&D $11,890,000

BPA is continuing its reseach, development, and demonstration program in response to Section 6(d) of the Regional Act, which permits the Administrator to acquire certain resources, other than major resources, if they are found to be projects of an experimental, developmental, demonstration, or pilot nature with potential for providing cost-effective service to the region. BPA expects to fund preliminary studies and derive information from sponsors' projects in FY 1983, with potential for RD&D projects in both FY 1983 and FY 1984. Studies currently being funded and projects being considered represent a variety of technologies, including biomass, wind, geothermal, solar, hydropower, and modifications of conventional technologies.

3. Resource oversight $680,000

BPA's Resource Oversight program has two principal areas of focus: oversight of the Supply System's Nuclear Projects 1, 2, and 3; and oversight of acquisitions made under the Regional Act. Different aspects of oversight, such as financing, budget, fuels management, power marketing, and construction, are assigned to organizations within BPA.

The oversight of Supply System nuclear plant construction is centered in a staff of engineers and analysts located at BPA in the Portland headquarters; at the Supply System headquarters in Richland, Washington; and at the three plant sites. BPA exercises oversight both in an advisory sense and through its various authorities. These authorities include its right to disapprove line items in the Supply System's budget, the requirement that BPA concur in contract actions over $500,000 and in certain expenditures from the contingency funds, and through its tracking of the Supply System budgets.

The requirement for oversight of Regional Act acquisitions is based on Section 6(i) of the Act, which states that contracts for the acquisition of resources "shall contain terms and conditions...(to) (1) insure timely construction, scheduling, completion, and operation of resources, (2) insure that the costs of any acquisition are as low as reasonably possible, consistent (A) with sound engineering, operation, and safety practices, and (B) the protection, mitigation, and enhancement of fish and wildlife..., and (3) insure that the Administrator exercises effective oversight, inspection, audit, and review of all aspects of such construction and operation."

The $680,000 represents the costs associated with the construction oversight of the Supply System plants. Additional oversight in nonconstruction areas and for Regional Act acquisitions is exercised by BPA and incorporated into other areas.

4. Continuing acquisitions and power purchases $858,600,000

a. Pre-Regional Act acquisitions

(1) Hanford Generating Project $34,400,000

The reason for the increase between FY 1983 and FY 1984 is that, under the terms of contracts in effect through June 30, 1983, Hanford Generating Project (HGP) output is shared equally by investor-owned utilities and BPA's direct-service industrial customers, with BPA and its preference customer participants in HGP retaining the right to withdraw the power from the DSI's in any operating year (July 1 through June 30). For the 1981-1982 operating year, BPA withdrew the public agencies' share of HGP output from the industries and used the output to meet firm energy commitments. For the 1982-1983 operating year, BPA did not exercise the withdrawal provisions so the DSI's will receive HGP output.

In July 1982, the Supply System and the Department of Energy (DOE) executed a new contract (Hanford Steam Energy Agreement) providing for the Supply System's purchase of byproduct steam from DOE's N Reactor. This contract is effective June 30, 1983, through June 30, 1993, and effects an extension of the contracts which terminate on June 30, 1983. Additionally, BPA and the Supply System executed a new contract in July 1982 providing for the continued operation and funding of HGP. The BPA/Supply System contract is effective on June 30, 1983, and terminates when the Hanford Steam Energy Agreement terminates. Fifty percent of the output of HGP will continue to be purchased by the public agency participants who will continue to exchange their rights to HGP output for firm power delivered from BPA at BPA preference rates. Pursuant to the legislation for the N Reactor Project and, in accordance with agreements reached in 1974, the other 50 percent of HGP output will continue to be offered to the five investor-owned utility participants at project costs. It is currently anticipated that the DSI's will not be offered an assignment of the public agency participants' share under the new contract.

Under the existing agreements, the investor-owned utility participants and the DSI's pay their share of HGP costs through trust fund arrangements. The investor-owned utilities will continue paying their share of HGP costs through trust fund arrangements under contracts for the continued operation of HGP after 1983. The Reimbursable section of this document contains these costs. The public agency participants currently pay their share of HGP costs through an exchange power process. This exchange power process will continue under the new contract. Those costs are included in this section.

(2) Trojan Nuclear Plant $44,500,000

BPA has acquired Eugene Water & Electric Board's (EWEB) 30 percent share of the Trojan Nuclear Plant (Trojan) through net-billing agreements. Trojan is a 1,130-MW plant located near Rainier, Oregon, which became commercially operational in May 1976. Costs associated with Trojan are paid to EWEB either through net billing or cash payments. EWEB then pays its share of Trojan's annual costs to Portland General Electric. Under net billing, credits equal to participants' (BPA preference customers participating in generating projects) obligations to BPA for power and other services are given to participants on their monthly bills. The participant then pays an equal amount to the generating project for its share of the project. As a result of this process, BPA acquires the participants' shares of the projects. Net billing is required by contract. If a participant's net-billing capability is insufficient to pay its share of Trojan's annual costs, BPA makes cash payments equal to the deficiency to EWEB.

(3) WNP-1, -2, and -3 .... $759,800,000

BPA has acquired 100 percent of the capability of Supply System Projects 1 and 2 and 70 percent of the capability of Project 3 through net-billing agreements with the Supply System and BPA preference customer participants and through exchange agreements with investor-owned utilities. The plants are being constructed by the Supply System in Washington State. Under the terms of these agreements, BPA began paying debt service and related costs for WNP-1 in July 1980, for WNP-2 in January 1977, and for WNP-3 in July 1982 and will begin paying operating costs upon commercial operation of each unit. WNP-2 is scheduled for commercial operation in February 1984, so the costs included in FY 1984 for that project are for both debt service and operating costs.

On April 19, 1982, BPA's Administrator recommended to the Supply System Board of Directors that they extend completion of Project 1 up to 5 years. This recommendation was made following extensive analysis by BPA staff of complex financing and power supply issues. On the basis of analyses of need-for-power, economic, and financing issues, BPA concluded that such an extension would benefit the region. Recent load forecasts indicated that, while the region would need additional generating capacity in the 1990's, it faced possible surpluses of generating capacity in the 1980's. Other alternatives analyzed included marketability of new generating capacity in the 1980's both within and outside the region.

The Supply System Board of Directors, on April 29, 1982, approved the extended construction delay on Project 1 as recommended. On May 28, the Board adopted a plan for implementing the construction extension. The plan provided flexibility for accelerated construction to meet a commercial operation date earlier than June 1991 if load forecasts indicate that the generating capacity is needed earlier than that date.

After preparation of its 1983 Project 1 Financial Plan, the Supply System was directed by its Executive Board to revise that Plan to reflect a construction delay plan with no specific restart activities in the near future. The Project 1 estimates shown above are consistent with the revised Plan.

Major milestones were reached on Project 2 with completion of the cold hydro test of the reactor pressure vessel on August 27, 1982, and the integrated flush of the vessel fuel pool and systems on November 12, 1982. These tests verify the integrity of the reactor pressure vessel and associated piping and fulfill a necessary NRC licensing requirement. Test and start-up activities continue to support the schedule for commercial operation of the reactor by February 1984.

At Project 3, construction progress and productivity have exceeded the scheduled levels for the last 13 months. It is scheduled for commercial operation in December 1986. The project was approximately 66 percent complete at the end of November 1982.

Costs associated with Projects 1, 2, and 3 are paid to the Supply System either through net billing or cash payments, using the same process as that for the Trojan Nuclear Plant.

b. Other continuing acquisitions $19,900,000

In FY 1982, BPA entered into its first long-term power purchase contract under the Regional Act authority. This contract was for the purchase of energy from hydroelectric projects owned by the City of Idaho Falls.

During FY 1982, BPA also entered into short-term power purchase agreements to ensure its ability to meet the Administrator's firm power contractual commitments. These purchases are authorized by the Federal Columbia River Transmission System Act. Because of the region's surplus condition identified midway through FY 1982, BPA is not extending these contracts. The decline in funding in this area reflects the termination of the contracts and BPA's decision not to renew the agreements.

5. Power exchanges $914,400,000

Section 5(c) of the Regional Act authorizes an exchange of power between BPA and Pacific Northwest electric utilities to serve residential loads and the small farm loads considered as residential load. The exchange makes it possible for the region's utilities to have comparable wholesale power costs for the region's residential consumers.

The residential exchange was made available to the region in FY 1982 with the development of a methodology to determine the average system cost of the participating utilities and the offering of a Residential Power Exchange Agreement to the customers. The investor-owned utilities signed the Residential Power Exchange Agreement, as did three public utilities.

The Regional Act provided for the "ramping in" of the amount of power to be exchanged, beginning at 50 percent of the residential load on July 1, 1980, and increasing annually in equal increments to 100 percent of the residential load on July 1, 1985. This ramping is to minimize rate increases to the DSI's since the cost of the exchange during the first 4 years is borne primarily by the DSI's under Section 7(c)(1)(A). After July 1, 1985, the rates applicable to the DSI's will be established based on the rates charged by preference customers to their retail industrial consumers [Section 7(c)(1)(B)].

As a counterpart to the Residential Exchange, BPA has developed an Exchange Transmission Credit Agreement which it plans to offer to its public utility and cooperative customers in FY 1983 and which it expects many of its public customers to sign. This agreement recognizes the value of the generation and transmission services of the public utilities and forms a type of exchange to benefit the ratepayers of customer utilities to the same degree as if they had participated in the Residential Exchange.

6. Use of facilities and upstream storage $27,500,000

Included in the Use of Facilities item is BPA's participation in two agreements whereby power and energy are wheeled over the facilities of the Idaho Power and Utah Power and Light Companies to BPA customers in southeastern Idaho. Upstream storage benefits accrue to the owners of upstream non-Federal projects and are governed by the coordination agreements to which BPA is a party.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

ENERGY CONSERVATION

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
Residential Programs	47,967	190,640	219,630
Commercial and Industrial Programs	974	26,850	66,610
Public Agencies and Customers	15,023	44,550	29,850
Program Development	718	24,360	22,910
Total All Programs	64,682	286,400	339,000
External Financing	--	-32,900	-193,900
BPA Financing	64,682	253,500	145,100

The Regional Act requires BPA to treat cost-effective conservation as the region's highest priority electric power resource in planning to meet the Administrator's load-serving obligations [Section 6(a)(1) and 4(e)(1)]. Conservation programs are projected to require $145,100,000 from BPA borrowing and revenues in FY 1984, and an additional $193,900,000 from external sources. The total funded conservation program in FY 1984, $339,000,000, reflects continued expansion in regionwide programs and implementation of additional programs.

In the near-term period of forecasted resource surpluses, BPA is proceeding with conservation planning and acquisitions at a deliberate pace, stressing the need for continuity and a long-range perspective. Ongoing programs, such as Residential Weatherization and Street and Area Lighting, are being continued. Additional regionwide programs are to meet the criteria described in BPA's proposed Near-Term Resource Policy: acquisitions to be undertaken are those which would have the least impact on BPA's wholesale rates; a conservation program is to be initiated in the near term only if several years are required to reach targeted levels of energy savings; the bulk of a program's energy savings must occur during the period of forecasted power deficits; and the real levelized cost of such programs (in mills/kwh) must not exceed an appropriate level. In preparing to reduce future forecasted resource deficits, BPA is developing several pilot programs to test delivery and financing options so as to have proven mechanisms available for delivering targeted conservation by the late 1980's. These pilot efforts are being undertaken in all energy-using sectors--residential, commercial, industrial, and public/non-profit.

BPA has initiated studies to identify appropriate economic incentives and areas for potential additional programs to accomplish energy savings in the mid- to late-1980's. Current information indicates that substantial additional conservation potential exists beyond those areas addressed by existing and planned programs. The amount of potential cost-effective conservation is expected to increase as the forecasted resource deficits draw nearer and alternative resource costs increase. BPA expects, therefore, that future year budgets will include additional programs and higher funding levels for conservation than those currently reflected in BPA's outyear estimates.

Expenditures during FY 1982 for programs included in BPA's FY 1983 budget were lower than expected, primarily because of delays in program start-ups by the region's publicly owned utilities and because the region's investor-owned utilities decided not to participate in BPA's conservation programs until they had signed BPA power sales contracts in late FY 1982. In addition, some programs scheduled for start-up in mid-FY 1982 have been delayed, partly as a result of BPA's new load forecast. Total funding for conservation in both FY 1983 and FY 1984 is now planned at levels lower than those projected in the FY 1983 budget, reflecting a reassessment of the feasible pace of program implementation. Conservation programs are expected to achieve approximately 171 annual average megawatts in FY 1984, in addition to 152 annual average megawatts achieved in FY 1983.

BPA is continuing to develop external financing mechanisms for regional conservation programs, to supplement the financing available through Treasury borrowing. Through careful testing and design of financing mechanisms, BPA may be able to leverage conservation financing to achieve energy savings at a lower cost to the region's ratepayers than would be possible through Treasury borrowing. Several investigations and pilot financing efforts are being initiated to develop a range of financing options. In anticipation of the availability of feasible external financing mechanisms for conservation programs, planning for BPA borrowing assumes that a substantial portion of capitalized program costs are to be financed each year through means other than Treasury borrowing. The following program estimates cover total planned costs, including the portion of the programs expected to be financed externally.

Further details on conservation programs are provided below.

1. Residential programs $219,630,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
a. Home energy efficiency improvement			
Residential weatherization	26,484	157,310	184,380
Conventional water heating	15,999	23,790	13,040
Solar and heat pump water heating	--	5,670	14,700
Appliance Efficiency	--	160	110
Subtotal	42,483	186,930	212,230
b. New home construction	--	1,430	6,950
c. Residential pilot programs	5,484	2,280	450
Total	47,967	190,640	219,630

An increase of $28,990,000 is forecasted for this activity, reflecting both increases and decreases in program elements.

a. Home energy efficiency improvement $212,230,000

This activity consists of four program elements. Residential Weatherization provides for retrofitting existing electrically heated housing stock, including the installation of wall and ceiling insulation. House-tightening measures, such as storm windows, storm doors, and weatherstripping, are included where they do not pose indoor air quality problems or where mitigating measures can be taken. Exterior sheathing, blown-in wall insulation and movable window insulation may be added to the list of eligible program measures after the effectiveness of these measures has been more thoroughly tested. Nearly 100,000 homes are targeted for weatherization in FY 1984. A special effort is made to target low-income electricity consumers, through utilities and States, to insure that the energy savings available in low-income housing will be achieved. The Conventional Water Heating program provides for insulating electric water heaters and installing flow-reduction devices in showers and hot-water faucets. This program consists of what previously were three separate programs (Water Heater Wraps, Shower Flow Restrictors, Flow Control), consolidated in FY 1983 for administrative efficiency.

The Solar and Heat Pump Water Heating program provides a financial incentive for residential electricity users to install either solar or heat pump water heating devices. The FY 1984 budget would provide for the installation of 20,000 solar or heat pump units. The Appliance Efficiency program provides information to consumers on the relative energy efficiency of various brands of home appliances. This program rounds out BPA's residential programs, by providing appliance efficiency information in a format that is more understandable and comprehensive than information currently available from other sources.

The Weatherization and the Solar and Heat Pump Water Heating programs provide financial incentives in the form of energy buy-backs or loans to consumers. Under the Conventional Water Heating program, BPA reimburses its utility customers for providing conservation materials directly to consumers.

The total FY 1984 program funding for the Residential Weatherization Program reflects the expected increase in the pace of weatherization activity in FY 1984. The substantially lower funding for Conventional Water Heating in FY 1984, compared to FY 1983, reflects the peaking of water heater insulation activity in FY 1983. Funding for the Solar and Heat Pump Water Heating program is expanding as utilities increase their pace of implementation.

Current cost estimates for Residential Weatherization in FY 1983 are lower, and in FY 1984 are higher, than the respective estimates in BPA's FY 1983 budget. Preliminary utility estimates of consumer demand for weatherization services, however, indicate that BPA's FY 1983 estimate may be too conservative since most utilities have now laid the groundwork for stepped-up program implementation.

The FY 1983 and FY 1984 estimates for Solar and Heat Pump Water Heating also are lower than the respective estimates in the FY 1983 budget. These changes document the region's recent experience, indicating that longer times are required than originally expected for utilities to gear up for complex conservation programs. The FY 1983 and FY 1984 estimates for Conventional Water Heating are higher than the respective estimates in the FY 1983 budget document, reflecting slippage from FY 1982 because of delays in utility implementation efforts and retroactive reimbursement payments in FY 1983 which had been expected in FY 1982.

b. New home construction $6,950,000

This program offers financial incentive payments to encourage the use of conservation or solar design techniques in new home construction. The program is designed to allow participating utilities to specify the details of the financial incentive package to meet local conditions and achieve appropriate program penetration rates. The program is being expanded in FY 1984 in support of model building standards to be issued by the Regional Planning Council.

The total FY 1984 request for funding reflects BPA's plans to expand the program from its pilot phase in FY 1983 to regionwide implementation. Program costs are lower in FY 1983 than previously estimated because program start-up was delayed to mid-FY 1983 due to concerns over whether monetary incentives for electric energy efficiency would cause fuel switching from other energy sources to electricity. FY 1984 funding is speculative, because of uncertainties over the Regional Council's model standards.

c. Residential pilot programs $450,000

The FY 1984 budget includes funding for four residential sector pilot programs: Appliance Efficiency Incentives, Solar Domestic Water Heating, Solar Water Heating Workshops, and Small Wind Data Collection. The delivery mechanism for the Appliance Efficiency Incentives pilot program has not been determined, since this pilot is now under development. The other three pilots are implemented through utilities which have volunteered to participate in the programs.

The decrease of $1,830,000 in FY 1984 results from the completion of the Residential Weatherization pilot program in early FY 1983, and the winding down of the solar water heating pilots in FY 1984.

The Appliance Efficiency Incentives pilot focuses on financial incentives as a potential supplement to the Appliance Efficiency information program initiated in FY 1983. The financial incentives pilot is intended to test the effectiveness of various delivery mechanisms and incentive levels in encouraging consumers to purchase energy-efficient appliances. The cost in FY 1984 is $160,000.

The Solar Domestic Water Heating and Solar Water Heating Workshop pilot programs provide cash payments and loans to homeowners with electric water heating for certified solar water heating systems and furnish information to homeowners through workshops on designing and installing solar water heating systems. Workshop participants are also eligible to receive financial assistance from BPA for installing a residential solar water heating system. At completion, the two pilot programs will have provided assistance and financial incentives for the installation of 1,000 solar water heating systems at an annual electric energy savings of approximately 0.25 average megawatt. Costs for these two pilots are $240,000 in FY 1984. It should be noted that the Solar

Domestic Water Heating pilot program participants are being integrated into the Solar and Heat Pump Water Heating program as BPA expands its efforts in this area.

The Small Wind Data Collection pilot program provides for the installation and monitoring of anemometers, to collect and analyze data on wind energy potentials. Expenditures in FY 1984 are approximately $50,000.

2. Commercial and industrial programs $66,610,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
a. Commercial lighting and water heating	934	7,850	9,480
b. Commercial energy audit	—	6,080	6,080
c. Commercial financial incentives	—	—	10,110
d. Section 6(a) acquisitions	—	11,210	35,040
e. Commercial/industrial pilot programs	40	1,710	5,900
Total	974	26,850	66,610

An increase of $39,760,000 in FY 1984 is forecasted for programs in this sector, reflecting increases in all areas except Commercial Energy Audit, and the start-up of one new regionwide program in FY 1984.

a. Commercial lighting and water heating $9,480,000

This program provides reimbursements to utilities which provide shower flow restrictors and water heater wraps to commercial electric water heating customers, and rebates to commercial establishments up to $1.00 per lamp for replacing interior fluorescent lamps with more efficient lamps. For exterior lights, BPA proposes to pay a fixed rate reimbursement covering a portion of the cost of converting incandescent, mercury vapor, and fluorescent lights to lower voltage high-pressure sodium, low-pressure sodium, and metal halide luminaires. This program consists of what was shown in BPA's FY 1983 budget as two separate programs (Lighting and Water Heating, Lighting Conversion Service).

The increase of $1,630,000 in FY 1984 reflects an expected increase in conversions of outdoor lights, more than offsetting expected decreases in water heater wrapping activity. The current estimates for FY 1983 are lower, and for FY 1984 are higher, than shown in BPA's FY 1983 budget, because of a slower program start-up and later program peak than previously expected.

b. Commercial energy audit $6,080,000

The Energy Audit program offers three levels of audits through utilities to commercial energy users. The choice of the appropriate level of audit depends on the complexity of the building energy use systems and the building's total annual energy consumption.

The audits provide building owners and operators with information on specific measures which could be implemented to improve energy efficiency, the cost of the measures, and the probable associated energy savings. The measures include simple operation and maintenance activities, simple retrofits, and complex retrofits requiring substantial capital investments.

Current estimates for FY 1983 and FY 1984 are at approximately the same levels as shown in BPA's FY 1983 budget, although program start-up slipped from FY 1982 to FY 1983 because of the time required to work with the region's utilities to develop a workable program design.

c. Commercial financial incentives $10,110,000

The Financial Incentives program is intended to operate in conjunction with the Commercial Energy Audit, providing financial assistance to commercial building owners and operators to encourage them to undertake energy efficiency improvements recommended in the energy audits. Design work on the program is being completed in FY 1983, with the initial program offering in FY 1984. The program is intended to provide flexibility to program implementors, while making use of the most cost-effective mechanisms to achieve the potential energy savings.

The delay in offering this program from mid-FY 1982 to FY 1984 reflects the need for additional program development time due to the technical and administrative complexity of the program. The program delay has provided BPA with additional time to determine the most cost-effective methods for achieving the available energy savings prior to program start-up. The current estimate for FY 1984 is lower than shown in BPA's FY 1983 budget because program implementors are expected to need time to gear up in FY 1984 to offer this program.

d. Section 6(a) conservation and direct-application renewable resource acquisitions $35,040,000

This program provides funding for feasibility studies proposed in response to targeted solicitations, and for acquisitions of conservation and direct-application renewable resources. The program is designed to elicit energy savings from a variety of sources which are too diverse to permit acquisition under a single set of specifications applied regionwide. Projects which receive funding are primarily in the industrial sector, including waste heat recovery, municipal water and waste water treatment facilities, and industrial process improvements. Significant savings potential has been identified in the direct-service industrial sector, especially in efficiency improvements in aluminum reduction. Feasibility studies are funded as a mechanism to bridge the information gap between research and development efforts and the site-specific documentation necessary before proceeding with acquisitions. Unsolicited proposals and billing credits for conservation and direct-application renewable resources also may receive funding under this program.

The request of $35,040,000 in FY 1984 reflects the expected initiation of billing credit payments in that year and a substantial increase in funding for direct energy acquisitions. The current estimates for both FY 1983 and FY 1984 are lower than shown in BPA's FY 1983 budget, because the projected near-term surpluses have rendered some potential projects temporarily not cost-effective.

e. Commercial/industrial pilot programs $5,900,000

The FY 1984 budget includes funding for five commercial/industrial sector pilot programs: Industrial Technology Transfer, New Commercial Buildings, Workshops on Commercial Conservation Products and Techniques, Industrial Process Audit, and Irrigated Agriculture. The request of $5,900,000 in FY 1984 reflects the start-up of the New Commercial Buildings pilot, Workshops on Commercial Conservation Products and Techniques, and the Industrial Process Audit pilot, and expansion in the Irrigated Agriculture pilot.

The Industrial Technology Transfer pilot consists of technology exchange workshops and demonstrations, designed to provide information primarily to small industrial firms concerning energy efficiency in such areas as electric motors, electric furnaces, and waste heat recovery. Technology exchange workshops are coordinated and funded by BPA in cooperation with local utilities. Demonstrations are partially funded by BPA. Funding in FY 1984 is $210,000.

The New Commercial Buildings pilot is being initiated in FY 1984, through the issuance of an RFP to elicit proposals from utilities, local governments, and others for innovative approaches to stimulate increased energy efficiency in new commercial buildings. Workshops, technical assistance, energy efficiency rating systems, awards for energy efficiency, and an energy buy-back arrangement are among the types of efforts which may be undertaken. The long-term need for a program to stimulate greater energy efficiency in commercial buildings is underscored by the prevalence of leasing arrangements in the commercial building sector, under which first cost considerations tend to overshadow energy efficiency concerns. FY 1984 funding of $320,000 is for the solicitation, evaluation, and selection of cosponsors, with implementation of several pilot efforts scheduled for late FY 1984 or early FY 1985.

Workshops on Commercial Conservation Products and Techniques are being offered in FY 1984, to provide technical assistance to help commercial building owners and operators reach informed decisions about which measures, if any, should be taken to economically improve building energy efficiency. The workshops are intended to directly supplement the Commercial Energy Audit program, increasing the likelihood that maintenance or retrofit measures recommended by an energy audit will be undertaken. Funding in FY 1984 is $230,000.

The Industrial Process Audit pilot program is intended to test the effectiveness of an informational audit in stimulating greater energy efficiency in the industrial sector through low-cost adjustments in operations and maintenance, motor efficiency improvements, and other activities. The pilot is intended to address the potential for energy savings in industrial processes, which represent the bulk of the energy use and savings potential in the industrial sector outside of BPA's direct-service industrial customers. The Industrial Process Audit pilot begins in FY 1984, at a level of $3,080,000, following the completion of program environmental and design work in FY 1983.

The Irrigated Agriculture pilot program operating during FY 1984 is a continuation of a multi-stage effort begun in FY 1982 to develop an effective regionwide irrigated agriculture conservation program. The FY 1984 effort tests the effectiveness of financial incentives in encouraging irrigators to implement energy-saving measures in their agricultural operations. This stage of the pilot effort builds on activities initiated in FY 1982, which gathered information on the costs and administrative requirements involved in energy analyses of farm irrigation systems. This pilot program is being developed and implemented in cooperation with interested utilities, State and Federal agricultural agencies, and universities. FY 1984 requested funding reflects greater expected farmer participation in the second year of this stage of the pilot program.

3. Public agencies and customers $29,850,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
a. Street and area lighting	10,980	31,180	15,460
b. Institutional buildings	—	8,360	8,360
c. Assistance for States and local governments	4,043	3,890	3,890
d. Customer system efficiency pilot program	—	1,120	2,140
Total	15,023	44,550	29,850

The backlog of street lighting conversions experienced in prior years is expected to be completed in FY 1983.

a. Street and area lighting $15,460,000

Funding is provided for the replacement of street lamps and associated hardware with more energy-efficient lamps. Utilities participating in the program perform the lighting replacements in cooperation with the affected local governments. States also may participate in the program, replacing State-owned lights in service areas of BPA customers. BPA reimburses participating utilities and States for labor, administrative, and materials costs up to a designated limit.

The request of $15,460,000 in FY 1984 reflects the completion in FY 1983 of lighting replacements delayed from the previous year. The current estimate for FY 1983 is higher than shown in BPA's FY 1983 budget, because of slippage in planned program activity from FY 1982. The current estimate for FY 1984 is lower than shown in BPA's FY 1983 budget, because of lower cost per lighting replacement than previously expected.

b. Institutional buildings $8,360,000

This program provides funding for energy audits, technical analysis, and qualifying retrofit conservation projects in institutional buildings. Funding recipients include schools, hospitals, public care institutions, and Federal, State, and local government agencies. The program is implemented through the four northwest State governments, building on the States' experience in administering the U.S. Department of Energy Institutional Buildings grant program. Funding covers State administrative costs, building energy auditor training, technical studies, and electric energy savings achieved through retrofits. BPA payments are based on the cost of retrofit conservation measures and the estimated energy savings expected from those measures.

c. Assistance for States and local governments $3,890,000

Funding is provided for technical assistance to local governments under cooperative agreements with the northwest States' energy offices, for design of community energy plans and programs to promote efficient use of electricity. Technical assistance is provided in assessing the energy savings potential of local energy resources, development of small-scale electrical generation from renewable resources, local governments facilities management, and the development of energy-efficient land-use codes and zoning ordinances. Two projects being added to the existing cooperative agreements in FY 1982 may be continued in FY 1984: training for enforcement of energy-efficient building codes, and implementation and testing of a residential energy-efficiency rating system. The State Energy Offices may provide the technical assistance themselves or, when appropriate, contract for the necessary services and expertise.

This program also provides funding for technical assistance and technology transfer to small consumers in the areas of conservation and direct-application renewable resources via the northwest State Energy Offices and the Energy Extension Services. Assistance includes informational and referral services, resource libraries, hands-on workshops, and classes. Informational and educational efforts concentrate on efficiencies in space heating, water heating, and lighting as well as solar and other renewable resource applications. Technical assistance activities target both residential and small commercial consumers. Approximately $975,000 is provided directly to local governments and Indian tribes for energy conservation and renewable resource development planning.

d. Customer system efficiency pilot program $2,140,000

This pilot program provides funding to cover a portion of the cost of implementing measures to reduce electricity losses on BPA's utility customers' transmission and distribution systems. System losses are reduced by reconductoring distribution lines, replacing transformers, sizing new facilities appropriately, and increasing voltage levels. This effort follows and builds on a detailed assessment, to be completed in FY 1983, of the potential for cost-effective energy savings in system efficiency improvements.

Preliminary assessment of the potential for energy savings indicates that 300 average megawatts could be saved if customer system losses were reduced to no more than 5 percent of power transmitted. The pilot program is expected to extend over 3 years and is intended to test the effectiveness of administrative and financing mechanisms prior to the possible implementation of a regionwide program.

The request of $2,140,000 in FY 1984 reflects the first year of funding for cost-sharing in system improvement projects under the pilot program.

4. Program development $22,910,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
a. Marketing and evaluation	-	16,290	15,090
b. Technical studies	718	8,070	7,820
Total	718	24,360	22,910

a. Marketing and evaluation $15,090,000

This program activity includes investigation and testing of potential external financing techniques, evaluation of the effectiveness of conservation programs, and assessments of the conservation potential available in the region, and testing of marketing techniques to stimulate participation in conservation programs.

External financing investigations cover a broad range of potential sources of financing for conservation to supplement BPA's borrowing authority. The range of BPA's efforts reflects the need to design financing mechanisms to meet the specific needs of each of the economic sectors affected.

Under a "shared savings" approach, third-party installers of conservation measures and private-sector financiers would be reimbursed by BPA or by the end-use electricity user based on the value of energy saved. Installers would profit because of the difference between the cost of achieving the energy savings and the value to BPA of reducing the need for additional generating resources. Investigations are also underway focusing on leasing mechanisms in the industrial sector as a means to finance conservation. Work is continuing on developing a mechanism to use publicly owned utility tax-exempt revenue bonds to finance conservation, with BPA arranging to assume debt service obligations on the bonds. Under a joint project with the Department of Energy, BPA is analyzing the potential for private financing alternatives for implementation of conservation measures in the public and private nonprofit sectors. Finally, BPA is developing an information exchange program for use with primary lenders to encourage financial institutions in the Northwest to use innovative financing mechanisms developed elsewhere to implement conservation.

Program evaluation activities cover residential, commercial, industrial, and nonprofit institutional conservation programs. These activities are key elements in ensuring that BPA's conservation efforts are effective and economical. Funding for evaluations covers the cost of both designing and conducting program evaluations.

Assessments of conservation potential address both the broad potential for cost-effective conservation in the region as well as detailed investigations into the factors affecting implementation of conservation measures by consumers. Investigations also are conducted into the effect of conservation measures on system peakloads and on the potential for displacing the need for additional transmission capacity through implementation of conservation.

A major case study of marketing techniques initiated in FY 1983 is being continued in FY 1984, in cooperation with local utilities, the Pacific Northwest Utilities Conference Committee, and the Regional Council. The Hood River Conservation Project is designed to demonstrate and document the conservation potential of a limited geographic area over a short period of time, and will provide the region with a test of the effectiveness of marketing techniques in stimulating conservation in the residential sector. Funding of $8,960,000 in FY 1984 covers residential and commercial energy audits, residential heat pumps, home weatherization materials, marketing, and project evaluation.

b. Technical studies $7,820,000

Technical studies include testing of conservation measures to document their effectiveness prior to inclusion in BPA conservation programs, engineering investigations to improve conservation technology applications, and environmental studies required to ensure the safety of planned conservation activities.

In FY 1984, testing will cover a broad range of measures, including blown-in wall insulation, solar water heating technologies, and indoor air quality monitoring. Engineering investigations will include work on refining the efficiency of heating-only heat pumps, demonstrating electric motor technologies, increasing industrial process energy efficiency, developing designs for new commercial buildings to reduce energy consumption, and demonstrating direct-application renewable resource technologies. FY 1984 engineering investigations are expected to include projects initiated in FY 1983 as a result of a Notice of Program Interest (NOPI) issued by BPA in FY 1982. The objective of the NOPI is to develop conservation and direct-application renewable resources in the commercial and industrial end-use sectors which are not now available for cost-effective application, but have potential for cost-effectiveness in the near future. Environmental studies will address the potential environmental effects of conservation retrofits in existing structures and industrial processes, as well as the effects of energy efficient designs in new buildings. BPA relies heavily on outside contractors for the conduct of technical studies.

CONSERVATION PROGRAMS
(in thousands of dollars)

	FY 1982 Actual Obligations	FY 1983		FY 1984		FY 1985 - FY 1988	
		Estimated Budget Requirements	Estimated Energy Savings 1/	Estimated Budget Requirements	Estimated Energy Savings 1/	Estimated Budget Requirements	Estimated Energy Savings 1/
Residential Programs							
Home Energy Efficiency Improvement							
Residential Weatherization	26,484	157,310	53.9	184,380	119.4	725,200	337.7
Conventional Water Heating	15,999	23,790	60.1	13,040	105.9	28,500	207.6
Solar and Heat Pump Water Heating	--	5,670	2.5	14,700	7.5	88,300	47.5
Appliance Efficiency	--	160	2/	110	2/	400	2/
New Home Construction	--	1,430	2/	6,950	2/	--	2/
Residential Pilot Programs	5,484	2,280	3/	450	3/	--	3/
Commercial and Industrial Programs							
Commercial Lighting and Water Heating	934	7,850	16.3	9,480	24.8	19,700	31.1
Commercial Energy Audit	--	6,080	2/	6,080	2/	7,100	2/
Commercial Financial Incentives	--	--	--	10,110	3.1	11,800	6.2
Section 6(a) Acquisitions	--	11,210	2.6	35,040	34.4	144,600	89.2
Commercial/Industrial Pilot Programs	40	1,710	3/	5,900	3/	19,600	3/
Commercial Sector Planning 4/	--	--	--	--	--	60,600	29.5
Public Agencies and Customers							
Street and Area Lighting	10,980	31,180	8.8	15,460	13.1	22,700	18.4
Institutional Buildings	--	8,360	7.3	8,360	14.6	31,900	36.5
Assistance for States and Local Governments	4,043	3,890	2/	3,890	2/	10,100	2/
Customer System Efficiency Pilot Program	--	1,120	3/	2,140	3/	9,900	3/
Program Development							
Marketing and Evaluation	--	16,290	--	15,090	--	29,100	--
Technical Studies	718	8,070	--	7,820	--	38,800	--
TOTAL ALL PROGRAMS	64,682	286,400	151.5	339,000	322.8	1,248,300	803.7
Less External Financing	--	-32,900		-193,900		634,900	
TOTAL BPA FINANCING	64,682	253,500		145,100		613,400	

1/ Energy savings are shown in annual average megawatts, cumulative as of the end of each year. The savings shown in FY 1984 include the savings achieved as a result of expenditures in FY 1983. The savings shown in FY 1985-1988 include the savings achieved as a result of expenditures during FY 1983-1988.

2/ Energy savings are uncertain.

3/ Energy savings are not estimated for pilot programs.

4/ Planned pilot programs are expected to lead to regionwide efforts in FY 1985 in new commercial building efficiency, targeted commercial building retrofits, and irrigated agriculture.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

TRANSMISSION SYSTEM PLANNING AND CONSTRUCTION
Program Overview

The purpose of BPA's Transmission System Construction program is to assure an adequate, safe, efficient, and reliable electric service to the Pacific Northwest for the achievement of social, economic, conservation, and environmental goals by planning and analyzing the transmission system, conducting research and development, and engineering and constructing necessary electric power transmission facilities.

BPA's proposed Transmission System Planning and Construction program for FY 1984 is estimated to require total budget obligations of $216,900,000, compared to FY 1983's program of $218,700,000. Of the total program, approximately 70 percent is for continued construction of facilities previously programed and underway (carryover), and about 30 percent is for initiation of construction of proposed system additions (new starts), acquisition of capital tools and equipment, and research and development.

The carryover component of the program continues to be the largest portion of the program. Funding reflects continued work of FY 1983 and earlier new starts and incorporates schedule changes due to increased environmental analysis requirements, changes in plans of other utilities, slippage in completion of new generating resources, and reduced load growth forecasts due to the reduced level of economic activity in the region and rising electric energy costs.

The new starts program for FY 1984 is estimated to cost $85,660,000, requiring obligations of $50,130,000 in FY 1984. It includes various main grid and area service new starts, which comprise about one-half of the new starts program's total costs. There are no "major transmission facilities" proposed for FY 1984 which require specific congressional approval.

In keeping with its responsibility to operate on the basis of sound business principles, BPA coordinates the energization schedules of new facilities and those underway with load-resource dynamics in the region. With load growth rates declining, construction delays are increasing in number. Just since the start of FY 1982, numerous major facilities have been canceled, delayed, or changed in scope. Thus, for FY 1983 and FY 1984, BPA will have, respectively, approximately 2,100 and 1,800 circuit-miles of transmission line under construction and will complete and energize 435 and 310 of those, respectively. Thirty-three substations will be under construction in FY 1983, and 26 in FY 1984. Corresponding energizations will be 9 in FY 1983 and 10 in FY 1984.

FACILITIES PROGRAMED IN PRIOR YEARS

SUMMARY OF SIGNIFICANT CHANGES

The reduced level of economic activity in the region has prompted reductions of forecasts of load growth of BPA customers, and its industrial customers are operating well below full capacity, reducing their electric demands. The rising cost of electricity has substantially reduced load growth. Compared with an annual average load growth history of up to 7 percent compounded annually before the early 1970's, BPA's latest load growth forecast estimates compounded annual increases of less than 2 percent. This has enabled BPA to defer and cancel construction of approved system additions due to reduced load growth in the region. The reduced load growth also defers the cost-effective energization date for completing facilities solely to reduce transmission system losses.

This construction program includes many modifications and adjustments to facilities proposed in prior years and under construction necessitated by changing economic conditions. Future economic changes may require BPA to make further adjustments in the program as allowed by the Federal Columbia River Transmission System Act. Specifically, the following facilities have been canceled and deleted from BPA's FY 1984 construction program, primarily due to reduced load growth:

La Grande-McNary 500-kV line	(item 108)
Seattle Area Reinforcement	(item 122)
Grand Coulee-Bell and Creston Integration	(item 127)
Kitsap Transformer Support	(item 228)
Mid-Columbia Area Reinforcement	(item 615)
Benton-Scooteney 115-kV Reconductoring	(item 719)
Teton Area Support	(item 720)

One of the key facilities programed in prior years and under construction is a large interregional intertie between eastern Montana and the Pacific Northwest, which will integrate non-Federal Colstrip generating projects into the Federal power system in the region. These facilities are BI 101, Western Montana Transmission, and BI 185, Hot Springs-Bell, which are scheduled for energization October 1985 and October 1986, respectively.

In January 1979, BPA presented total cost estimates for these two facilities combined of $221 million, with energizations scheduled for July 1983. The current energization schedules were reported in last year's budget presentation to the Congress and are due to delays in the commercial operation of the Colstrip generating units and due to additional environmental analysis work. This year's budget incorporates updated cost estimates for portions of the facility.

The additional environmental analysis for these facilities involves consideration of additional alternative routings for the portion of the facility between Garrison, Montana, and Spokane, Washington. These alternatives will increase the costs for Budget Item 101, Western Montana Transmission, and for Budget Item 185, Hot Springs-Bell, a related facility. These revised costs will be reported as soon as they are determined by final route determination, which is expected by early 1983. While precise costs cannot be stated now, the range of total costs for Budget Items 101 and 185 combined is expected to be between $325,000,000 and $350,000,000, depending upon the specific routing chosen. These revised costs will have multiyear budget impacts.

PROPOSED SYSTEM ADDITIONS

MAIN GRID

PORT ANGELES SYSTEM REINFORCEMENT (Item 132)

Scheduled Energization - October 1987

Description and Justification. These facilities will increase transmission capacity into the Port Angeles and Sappho areas of western Washington. Construction includes rebuilding the 27-mile Fairmount-Port Angeles section of the Olympia-Port Angeles No. 1 230-kV line to double-circuit 230-kV, installation of a 230/115-kV, 300,000 kVA autotransformer and 115-kV line terminal at Port Angeles Substation, installation of a 230-kV switchyard with five line terminals at Fairmount Substation, construction of a tap line from Happy Valley Substation to the new Fairmount-Port Angeles 230-kV, double-circuit line, and installation of power system control equipment.

These facilities are needed because an outage of the Shelton-Happy Valley-Port Angeles 230-kV line results in line loading which exceed the thermal capability of the Port Angeles 230/69-kV, 250,000-kVA transformer bank. Also, an outage of either the Port Angeles 230/69-kV, 250,000-kVA transformer, or the Shelton-Fairmount-Port Angeles 230-kV line overloads the Shelton-Happy Valley section of the Shelton-Port Angeles 230-kV line. In addition, these facilities will reduce transmission system losses by 3.7 megawatts.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	14,110	90	14,020

Work Proposed, FY 1984. Survey and design.

CENTRALIA REINFORCEMENT (Item 133)

Scheduled Energization - October 1985

Description and Justification. Reinforcement of transmission capacity in this area of western Washington will be provided by construction of a new 230/69-kV, 200,000 kVA Scammon Substation, a tap and .4-mile loop-in line connecting the new Scammon Substation to the 230-kV Olympia-Chehalis line, rebuilding of 1.8 miles of the Chehalis-Centralia 69-kV No. 2 line from the new substation to Fords Prairie, and installation of power system control equipment.

These facilities are needed to strengthen the 230/69-kV transformation at Chehalis Substation, and to provide additional 69-kV support for the Centralia and Fords Prairie loads. Without these facilities, an outage of the 250,000-kVA, 230-69kV transformer at Chehalis Substation will overload the remaining 100,000-kVA transformer. Also, an outage of the Chehalis-Centralia 69-kV No. 2 line will overload the Chehalis-Centralia 69-kV No. 1 line.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	3,900	2,260	1,640

Work Proposed, FY 1984. Survey, design, acquisition of land, and purchase of material.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
TRANSMISSION SYSTEM CONSTRUCTION

Program and Financing (in thousands of dollars)

89-4045-0-3-271

Item No.	Facility	Scheduled Energization	Estimated Total Cost	Actual Obligations To Sept. 30, 1981	Actual Obligations 1982	Estimated 1983 Program	Estimated 1984 Program	To Complete
Previously Programed Facilities			1,035,537	344,455	167,325	211,255	169,249	143,253
Proposed System Additions								
Main Grid								
132	Port Angeles System Reinforcement	10/87	14,110	--	--	--	90	14,020
133	Centralia Reinforcement	10/85	3,900	--	--	--	2,260	1,640
134	East Lewis County Support	10/85	2,220	--	--	--	750	1,470
135	Fall River-Lower Valley Reinforcement	10/87	10,280	--	--	--	890	9,390
136	Santiam-Chemawa 230-kV Reconductoring	10/85	920	--	--	--	320	600
150	System Reactive Facilities		4,000	--	--	--	2,340	1,660
	Subtotal		35,430	--	--	--	6,650	28,780
Area and Customer Services								
770	Customer Services		2,750	--	--	--	1,680	1,070
	Subtotal		2,750	--	--	--	1,680	1,070
General System Facilities								
810	General Structures and Improvements		3,020	--	--	--	2,550	470
820	Power System Control		8,010	--	--	--	4,970	3,040
830	Tools and Equipment		17,780	--	--	--	17,780	--
840	Preliminary Engineering		10,840	--	--	--	10,840	--
	Subtotal		39,650	--	--	--	36,140	3,510

(Continued)

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
TRANSMISSION SYSTEM CONSTRUCTION

Program and Financing (in thousands of dollars)

89-4045-0-3-271

Item No.	Facility	Scheduled Energization	Estimated Total Cost	Actual Obligations		Estimated 1983 Program	Estimated 1984 Program	To Complete
				To Sept. 30, 1981	1982			
	System Electrical Facilities							
871	Transformer Additions		3,360	--	--	--	2,820	540
880	Miscellaneous Replacements and Capital Additions		4,470	--	--	--	2,840	1,630
	Subtotal		7,830	--	--	--	5,660	2,170
	Total Proposed System Additions		85,660	--	--	--	50,130	35,530
	Items Completed in Current Year (1983)		69,069	47,938	15,432	5,699	--	--
	Completion of Prior-Year Programs		21,531	1,909	19,081	503	--	--
	Subtotal, Construction Program		1,211,797	394,302	201,838	217,457	219,379	178,783
	EPRI Support		23,220	120	7,700	7,700	7,700	--
	Undistributed Reduction Based on Unanticipated Delays - Brought Forward		--	--	--	--	--	16,636
	- Carried Forward		--	--	--	-6,457	-10,179	--
	Total Direct Obligations		1,235,017	394,422	209,538	218,700	216,900	195,419

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FACILITIES PROGRAMED IN PRIOR YEARS
(in thousands of dollars)

89-4045-0-3-271

Item No.	Facility	Scheduled Energization	Estimated Total Cost	Actual Obligations To Sept. 30, 1981	Actual Obligations 1982	Estimated 1983 Program	Estimated 1984 Program	To Complete
Main Grid								
100	D.C. Intertie No. 1 Uprating	2/85	39,890	153	34,088	4,320	1,230	99
101	Western Montana Transmission	10/85	228,230	62,233	45,897	68,970	48,080	3,050
112	Industrial Services	10/86	6,290	31	—	—	1,170	5,089
113	Allston-Portland Area Reinforcement	5/88	17,210	—	—	120	1,290	15,800
114	Fairview-Bandon-Rogue	10/83	8,910	3,833	443	4,550	84	—
116	Badger Canyon-Grandview Area Reinforcement	10/85	19,330	—	137	1,220	11,730	6,243
119	Flathead Valley Reinforcement	5/86	19,310	—	—	1,140	11,380	6,790
120	Bend Area Support	10/84	6,170	—	166	3,150	2,600	254
121	Grays Harbor Support	10/86	7,530	—	22	30	260	7,218
123	Olympic Peninsula Reinforcement	10/87	23,400	—	—	—	250	23,150
124	Bellingham Area Reinforcement	10/85	5,050	—	—	50	2,940	2,060
125	Big Eddy-Celilo Support	5/85	6,490	—	—	4,130	1,380	980
126	Longview Area Transformer Support	5/87	10,490	—	—	—	10	10,480
129	North Idaho Transformer Support	10/86	2,450	—	—	—	40	2,410
130	Boundary Integration and Colville Valley Support	10/85	27,140	—	—	11,530	13,550	2,060
150	System Reactive Facilities		8,540	3,810	1,380	2,380	710	260
183	Ashe-Willamette Valley	10/83	180,560	176,487	2,457	1,550	66	—
185	Hot Springs-Bell	10/86	59,520	884	397	1,800	31,820	24,619
188	WNP No. 3 Integrating Transmission	6/87	46,690	23,792	8,566	2,870	750	10,712
194	WNP No. 1 Integrating Transmission	8/85	7,460	2,910	91	—	—	4,459
197	Northern Idaho Support	10/84	28,010	10,366	6,404	6,265	4,920	55
	Subtotal		758,670	284,499	100,048	114,075	134,260	125,788

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FACILITIES PROGRAMED IN PRIOR YEARS
(in thousands of dollars)

89-4045-0-3-271

Item No.	Facility	Scheduled Energization	Estimated Total Cost	Actual Obligations To Sept. 30, 1981	Actual Obligations 1982	Estimated 1983 Program	Estimated 1984 Program	To Complete
	Area and Customer Services							
312	Albany Area Support	10/85	2,060	---	---	60	750	1,250
315	Clark County Support	10/84	2,230	---	---	1,350	860	20
316	Salem-Tillamook 115-kV Reconductoring	10/84	3,680	---	---	1,240	2,430	10
605	Okanogan Area Service	10/83	25,660	19,949	4,844	860	7	---
612	Trentwood Area Service	10/86	3,180	---	1,323	10	10	1,837
614	Okanogan Area Service - Phase II	10/85	2,150	---	---	---	1,290	860
717	Goshen-Swan Valley Uprating	10/84	1,860	877	465	350	158	10
718	Surprise Valley Area Service	10/84	11,000	---	---	9,610	1,370	20
721	Midway-Grandview 115-kV Reconductoring	5/85	3,010	---	---	60	1,360	1,590
722	North Pasco Support	10/86	440	---	---	---	---	440
770	Customer Services		36,830	5,540	8,332	15,460	5,280	2,218
	Subtotal		92,100	26,366	14,964	29,000	13,515	8,255
	General System Facilities							
810	General Structures and Improvements		25,420	2,278	9,228	11,250	2,594	70
820	Power System Control		56,620	12,466	9,423	14,500	13,720	6,511
830	Tools and Equipment		27,900	---	9,250	18,650	---	---
840	Preliminary Engineering		20,427	---	9,377	11,050	---	---
	Subtotal		130,367	14,744	37,278	55,450	16,314	6,581
	System Electrical Facilities							
871	Transformer Additions		29,530	10,242	8,955	5,750	2,950	1,633
880	Miscellaneous Replacements and Capital Additions		24,870	8,604	6,080	6,980	2,210	996
	Subtotal		54,400	18,846	15,035	12,730	5,160	2,629
	Total Programed in Prior Years		1,035,537	344,455	167,325	211,255	169,249	143,253

EAST LEWIS COUNTY SUPPORT (Item 134)

Scheduled Energization - October 1985

Description and Justification. BPA will rebuild the existing 15.7-mile, 69-kV transmission line between Silver Creek and Morton Substations in southwestern Washington to support the East Lewis County area. Construction will be 115 kV with initial operation at 69 kV.

Portions of the Silver Creek-Morton line will exceed its thermal limit during the 1985-86 winter peak when Washington Public Power Supply System's Packwood hydro electric project is operating under normal conditions. In addition, minimum voltage levels cannot be maintained at BPA's Morton Substation during the 1985-86 winter peak because of the weak 69-kV transmission system. Rebuilding the Silver Creek-Morton 69-kV line to 115-kV will solve these problems and fit into Lewis County Public Utility District's long-range plan to convert their 69-kV system to 115 kV in the East Lewis County area.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	2,220	750	1,470

Work Proposed, FY 1984. Survey, design, and purchase of material.

FALL RIVER-LOWER VALLEY REINFORCEMENT (Item 135)

Scheduled Energization - October 1987

Description and Justification. Facilities to be constructed to reinforce BPA's system in southeastern Idaho include a 70.5-mile, 161-kV, single-circuit Goshen-Drummond line, a line terminal and power circuit-breaker at Goshen Substation, a power circuit-breaker and 161/115-kV, 200,000-kVA transformer at Drummond Substation, and power system control equipment.

These facilities will provide increased transmission capacity and voltage support to the radial loads in the Targhee-Drummond-Macks Inn area as well as support the Palisades grid that serves Lower Valley Power and Light's loads. Without these facilities, the Goshen 161/115-kV transformers and Goshen-Palisades 115-kV line will overload January 1988 for an outage of either the Swan Valley 161/115-kV transformer or the Goshen-Swan Valley 161-kV line. Critically low voltages will also be experienced in the Teton and West Yellowstone areas during outage conditions. These facilities will also reduce the system transmission losses by 6.8 MW.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	10,280	890	9,390

Work Proposed, FY 1984. Survey and design.

SANTIAM-CHEMAWA 230-kV RECONDUCTORING (Item 136)

Scheduled Energization - October 1985

Description and Justification. BPA will reconductor the first 17 miles of the Santiam-Chemawa 230-kV line located in western Oregon from Santiam to the Bethel Tap. The existing conductor will be replaced with one having higher capacity and lower losses.

This construction is necessary for protection of the system from an outage of the Albany 230/115-kV transformer during the winter of 1992-1993. This facility has been advanced from 1992 to 1985 to achieve an average January loss savings of 1.55 MW.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	920	320	600

Work Proposed, FY 1984. Survey, design, and acquisition and purchase of material.

SYSTEM REACTIVE FACILITIES (Item 150)

Description and Justification. The addition of reactive capacity to the main transmission grid is a broad, long-range continuing program related to the addition of system loads, system voltage requirements, and facility loadings. The FY 1984 program includes new installations amounting to 200,000 kVA of system reactive capacity. These installations will be completed by the fall of 1985.

A continuing program of reactive additions is necessary to obtain the full power output of the Government's generating plants and to achieve the most economical operation of the transmission network. Reactive installations:

1. Raise the general voltage level of receiver-end substations,
2. Increase the power transfer capability of the system and decrease system losses, and
3. Provide voltage control under normal load variations and system emergency conditions.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	4,000	2,340	1,660

Work Proposed, Fiscal Year 1984. Design and purchase of material.

AREA AND CUSTOMER SERVICES

CUSTOMER SERVICES (Item 770)

Scheduled Energization - See List Below

Description and Justification. This item provides for transmission facilities required to meet increasing loads of specific customers served by BPA. Types of installations proposed for construction are transmission line extensions from the existing system and substation facilities to provide service at the customer's system voltage. All customer service facilities are constructed in accordance with engineering studies made jointly with the customer or customers concerned to determine the most economical and best engineering plan of service. Generally, estimated revenues to BPA from power sales over the initial 10-year period of operation must exceed the annual costs of the customer service facility proposed.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Additions	2,750	1,680	1,070

	Scheduled Energization	Total Cost	FY 1984	Required to Complete
		(In thousands of dollars)		
1. Long Beach Service Pacific County PUD	October 1985	450	290	160
2. Hilltop Service Flathead Electric Coop.	October 1985	800	430	370
3. New Line Tap and Metering Facilities	FY 1984	500	500	--
4. Miscellaneous Customer Service Transmission and Substation Facilities	FY 1985	1,000	460	540

1. Long Beach Service. This facility will provide a new 12.5-kV point of delivery to this BPA preference customer in western Washington. Construction includes a 115/12.5-kV, 25,000-kVA transformer, and tap and metering equipment. This facility will eliminate a low-voltage condition at the customer's load center, reduce losses, and provide an adequate source of power for future load growth.

2. Hilltop Service (Haskill Substation). BPA will construct a 230-24.9-kV, 25,000-kVA Haskill Substation and tap its Libby-Conkelley 230-kV transmission line at Haskill Substation to provide a new point of delivery for this western Montana preference customer. The facility will eliminate low voltage in the Hilltop area, reduce losses and provide for load growth.

3. Line Tap and New Metering Additions - All Areas. This item provides for anticipated, but as yet unidentified, line tap facilities for customer substations, the need for which develops rapidly. It also provides for metering at new customer substations or feeder additions at existing stations, both of which tend to be required by rapid load growth at these customer substations.

4. Miscellaneous Customer Service Additions. This item will provide funds for customer service facilities, the need for which will be identified during the budget year. In recent years, BPA preference customers have been experiencing very rapid, large load growth in small load centers, often caused by the addition of one or a few commercial type loads. Although BPA load growth in total has been declining, localized customer load growth in many areas has not. This item will permit timely response to customer needs.

Work Proposed, Fiscal Year 1983. Survey, design, acquisition of land, purchase of material, and construction of facilities.

GENERAL AND MISCELLANEOUS SYSTEM FACILITIES

GENERAL STRUCTURES AND IMPROVEMENTS (Item 810)

Scheduled Completion - Various (See below)

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	3,020	2,550	470

Facility	Scheduled Completion	Total Cost	FY 1984
		(In thousands of dollars)	
1. BPA System--Oil Spill Containment Facilities	September 1985	510	110
2. BPA System--Appearance Improvements	September 1984	250	250
3. BPA System--Flammable Liquid Storage	December 1984	190	170
4. Alvey Substation--Maintenance Vehicle Storage, Paving	December 1984	710	690
5. Ross Complex--Maintenance Addition, Fencing, Parking, and Storage	November 1984	980	950
6. General Structures--Miscellaneous, Minor Items	October 1984	380	380

1. BPA System. Oil spill containment facilities will be installed at eight BPA substations as phase 2 of a 5-year program of retrofitting existing facilities to meet Environmental Protection Agency oil pollution prevention regulations and BPA's goal of environmental preservation and enhancement.

2. BPA System. This item provides for appearance improvements at BPA substations, transmission line corridors, and line approaches to substations. Improvements include screening with trees, landscaping, painting, brush control, and soil erosion prevention.

3. BPA System. Storage facilities will be provided at four district headquarters locations for flammable liquids to meet safety and fire protection requirements.

4. Alvey. Additions to be made at Alvey Substation, the largest district headquarters in the Lower Columbia Area of western Oregon, include a 4,000-square-foot maintenance building to provide for 50 to 60 personnel, and a 4- to 5-bay vehicle storage building which, in complement with the existing 6-bay facility, will accommodate 19 vehicles. Also, in FY 1984, 130,000 square feet of the substation complex will be paved and provided with drainage.

5. Ross Complex. A 5,800-square-foot addition will be made to the Ampere Building at BPA's Ross Complex in Vancouver, Washington, to provide facilities for the expanded role of this facility in major rebuild and preventive maintenance. Security fencing will be provided for the Ross testing and training area which conducts maintenance and laboratory testing programs. The Ross Complex parking area will be paved. A 2,400-square-foot storage building will be constructed for central housing of transmission line stringing equipment.

6. General Structures. Frequently non-electric facility construction is needed at various BPA installations on an urgent basis. Funding is not specified for each facility because the needs are unknown until they occur. This is for minor building work, adding non-electric facilities, yard improvements, building lighting, energy conservation, road improvements, and compliance with executive orders. This item provides for safety and more economic or efficient operations.

POWER SYSTEM CONTROL (Item 820)

Justification and Description. System control and dispatch facilities are needed to modernize control center and substation control equipment to obtain comprehensive weather and snow cover data, maintain state-of-the-art power system control technology, better locate system faults, and obtain other necessary system state and operating information. Control channel facilities are needed to modernize line protection, microwave, and voice communication equipment and to furnish emergency restoration equipment for telecommunications. Miscellaneous control system additions are needed to accommodate unforeseen power system stability problems and system configuration changes.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Additions	8,010	4,970	3,040
1. System Control and Dispatch	2,360	1,020	1,340
2. Control Channel Facilities	4,950	3,550	1,400
3. Various Other Control Items	700	400	300

1. System Control and Dispatch. This item provides for replacing bus differential relays with solid state equipment at 13 230-kV substations and 8 115-kV substations, replacement of 13 substation annuniciators with solid state equipment, development and installation of a limited supervisory control remote system for small substations, and a power system island detection scheme and prototype low-cost RODS display system at the Dittmer Control Center in Vancouver, Washington.

2. Control Channel Facilities. This item includes the first phase of a five-phase microwave system replacement program through 1989 to change radio frequencies in order to vacate the 7900-7975-MHz band as requested by the National Telecommunications Information Administration. Also provided are an extension of the southwest Oregon microwave system, an extension of the southern Idaho VHF mobile radio communication system, upgrade replacements of Adel/Big Eddy radio equipment, automatic telemetering switching at the Dittmer System Control Center, the second of three phases of a low-density multiplex microwave replacement program, and addition of programmable VHF-multiplex channels under a VHF Modernization Project.

3. Various Other Control Items. This item provides miscellaneous control system additions.

TOOLS AND EQUIPMENT (Item 830)

Description and Justification. The tools and equipment covered by this item are required to engineer, construct, operate, and maintain the transmission lines, substations, and communications and control facilities which make up BPA's power system and to support data processing and word processing, office management, and other management services. Included are portable transportation and power-operated equipment, highly sophisticated electronic instruments and measuring devices needed for laboratory and field tests and maintenance of electronic equipment, power system control and communications equipment, ADP equipment for comprehensive information systems development and operation, and tools and equipment for BPA's power marketing and energy conservation activities.

BPA's network of electrical facilities increases in size and complexity each year, as does the amount of highly sophisticated electrical equipment and control devices required for its operation and protection. These facilities must be tested, serviced, and properly maintained, to insure that service interruptions are held to a minimum and that restoration of service when outages do occur is as rapid as possible.

The need for the funds requested to provide necessary tools and equipment is directly related to these service and maintenance requirements. The importance of reliability of the Federal power system, the added workload due to growth of the system, and the continued combination of staffing constraints and shortage of skilled personnel make it absolutely imperative that BPA forces be supplied with the tools and equipment needed to achieve a high level of efficiency and productivity.

	FY 1983	FY 1984
	(in thousands of	dollars)
1. Tools and Work Equipment	300	300
2. Transportation and Power-Operated Equipment	3,580	6,740
3. Automatic Data Processing Equipment	8,520	5,060
4. Office Equipment	2,030	2,140
5. Laboratory and Field Test Equipment	1,440	1,050
6. Power System Control Equipment	890	1,070
7. Electric Power Monitoring Equipment	1,890	1,420
TOTAL	18,650	17,780

1. Tools and Work Equipment. This item includes shop equipment, safety equipment, and work equipment required by BPA field construction, maintenance, and shop operations. These special-purpose tools and equipment allow the most practical and economical work performance under all types of working conditions. Acquisition of additional equipment of this type will enable field crews and shop workers to more safely and efficiently handle new, larger, more sophisticated electrical hardware, and other equipment. Replacement equipment requirements are based on safety, uneconomical repair costs, and the need for the most economical and efficient work performance.

2. Transportation and Power-Operated Equipment. This item provides for additional and replacement BPA-owned special-purpose equipment, primarily trucks, tractors, trailers, snow vehicles and material handling equipment.

3. Automatic Data Processing (ADP) Equipment. The FY 1984 program provides for upgrade items for the new computer system to be installed in FY 1983, additional satellite computers, upgrades to existing satellite computers, peripheral equipment for various computer systems, improved telecommunications, and miscellaneous equipment such as terminals and graphic devices.

Additionally, this item provides for ADP equipment for data base technology, system development, productivity improvements, and large-scale applications for ADP-based materials management, human resources management, financial management, and project management.

4. Office Equipment. Office systems, furniture, and equipment included in this budget item are needed to handle expanding paperwork and analysis workload to increase productivity, and to replace equipment which is obsolete or worn beyond economical repair. Included are word processing hardware and software, electronic typewriters, calculators, office furniture, and other equipment which will help reduce personnel requirements.

5. Laboratory and Field Test Equipment. A wide variety of electrical, electronic, mechanical, and chemical measurement and testing devices are needed to meet laboratory and field testing requirements for the design, construction, maintenance, and operation of our electrical transmission system. New, technically advanced instruments are needed to test the more sophisticated and high-speed control devices now being installed on the transmission system.

6. Power System Control Equipment. Additional electronic maintenance instruments are needed to maintain facilities used for telemetering, load frequency control, relaying, dispatching, and mobile communications throughout the BPA system. They will permit power system control maintenance crews to adequately maintain electronic control and communication equipment which is critical to the stability of the system. The Dittmer and Eastern Control Centers, with their space-age technology control systems, increase the type and complexity of equipment BPA power system control maintenance crews are required to service.

7. Electric Power Monitoring Equipment. This item provides for purchase of equipment for the Load Research Program. During FY 1984, BPA will acquire metering packages for assessing commercial and industrial loads in the region over the next 10 years.

PRELIMINARY ENGINEERING (Item 840)

Scheduled Completion - FY 1984

Description and Justification. Preliminary engineering funds permit advance reconnaissance, surveys, and land appraisals. This is necessary to permit start of construction in time to meet scheduled energization dates. Time advantage is also gained by early preparation of design studies and specifications for contract work.

As required by the National Environmental Policy Act, BPA gives full consideration to environmental factors in its program planning. This must be done early enough in the program planning process to allow meaningful consultation with environmental agencies and the public, and inclusion of environmental factors in project decisions. To carry out this objective, specific survey and design information will be required early in the planning process so that the impact of a specific line location on the environment can be evaluated. Also, information on the location and extent of environmental features, such as watersheds and wildlife areas, will have to be obtained and evaluated.

To meet the continuing need for new technology, BPA conducts an ongoing program of technical and scientific investigations of the varied aspects of electric power transmission. These are carried out through in-house investigations; single sponsor contracts with industrial firms, research corporations and institutions; cooperative investigations with other utilities, government institutions and industries.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	10,840	10,840	--

1. Continuation of the design and development of BPA's future high-capacity transmission system. Technological investigation and development activities to establish criteria for optimized design and construction include investigations in the following areas: evaluation of prototype 1,100-kV line performance; and evaluation of 1,100-kV gas-insulated bus and associated equipment furnished by DOE and EPRI for investigations at the Lyons test facility.

2. Application of new technologies can increase the effectiveness and reduce the costs of transmission and substation facilities. FY 1984 activities include replacement of equipment and improvement of transmission facilities to reduce system losses, studies and evaluation of completion through the use of improved technologies such as compressed gas-insulated equipment, implementation of new insulation systems for transmission lines, and evaluation and analysis of energy conservation measures.

3. The increased size and complexity of the transmission system require the adoption of new design and analytical concepts for planning. Efforts will be made to improve modeling of the power system and analytical techniques for simulation of stability and transient studies. Analytical techniques will be developed to make an assessment of system reliability as a planning tool, including multiple contingency analysis.

TRANSFORMER ADDITIONS (Item 871)

Description and Justification. This item provides for the addition of transformer capacity in BPA's substations. The principal types of capacity additions are the installation of new transformers and the replacement of existing lower-capacity transformers with those of higher capacity.

Additions to transformer capacity are necessary when BPA's existing facilities become overloaded, when they can no longer provide reliable service, or when they are unable to maintain an acceptable standard of voltage regulation.

The list of additions proposed for start of construction in FY 1984 may be subject to adjustment to conform to changing load and operating conditions which cannot be foreseen at this time. Provision is made for transformer additions on the BPA system that cannot be specifically anticipated or programed at this time.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Additions	3,360	2,820	540

Substation	Type of Addition	Scheduled Energization	Total Cost	FY 1984
			(In thousands of dollars)	
BPA System	Add one 500,000-kVA, 500/115-kV autotransformer as a system spare for emergencies	October 1985	2,260	2,260
BPA System	Add transformer cooling capacity at various substations	September 1984	100	100
BPA System	Miscellaneous transformer additions at various substations (unanticipated)	September 1984	1,000	460

MISCELLANEOUS CAPITAL ADDITIONS AND REPLACEMENTS (Item 880)

Description and Justification. This general item provides for scheduled replacement of units of property on the transmission system and for miscellaneous unforeseen minor capital additions or replacements.

Funds are required for design, materials, and installation of replacement power circuit-breakers, disconnect switches, wood poles, conductor, and other minor equipment items. Replacements are required when electrical facilities are worn out, damaged, destroyed, overloaded, or become obsolete. Capital additions are included when the cost involved is small and does not warrant segregation under a separate budget item number.

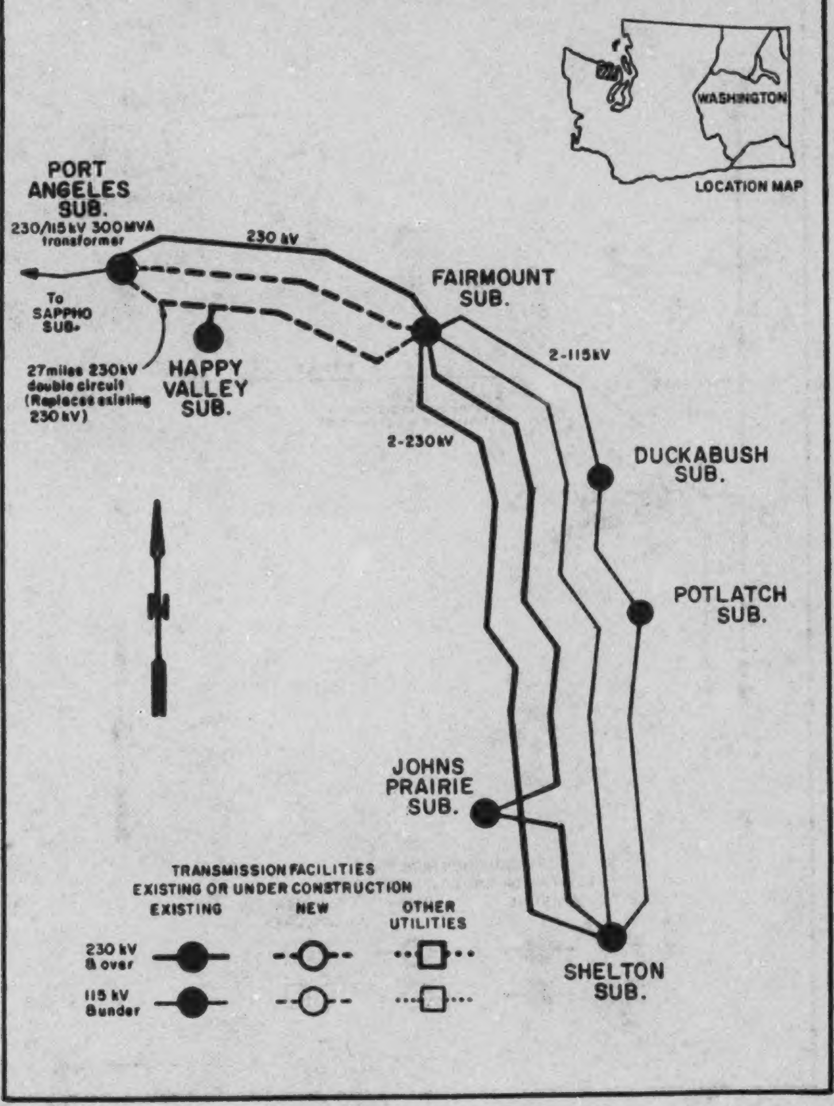
This item does not include replacements of system reactive facilities, general structures, power system control facilities, tools and equipment, and power transformers which are budgeted under Items 150, 810, 820, 830, and 871, respectively.

	Total Cost	FY 1984	Required to Complete
	(In thousands of dollars)		
Proposed System Addition	4,470	2,840	1,630
1. Power Circuit-Breaker Replacements	1,730	940	790
2. Various Substation Changes and Replacements	190	90	100
3. Airway Lighting Upgrades	150	150	--
4. System Capacity Upgrades	150	150	--
5. Miscellaneous System Changes	1,150	1,150	—
6. Wood Pole Replacements	1,100	360	740

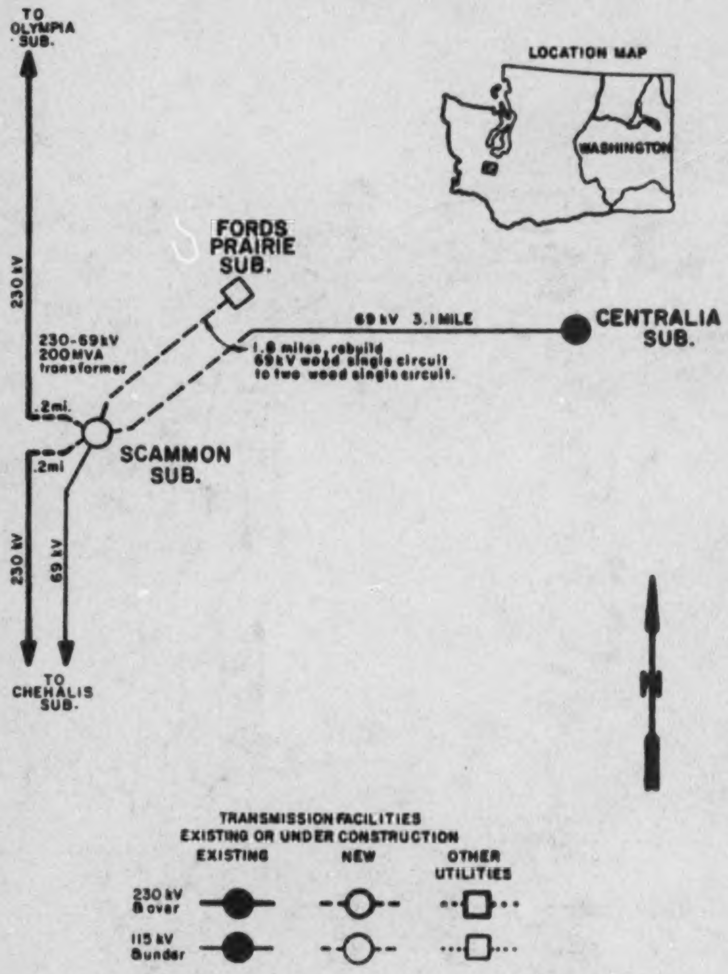
FINANCIAL PARTICIPATION IN EPRI

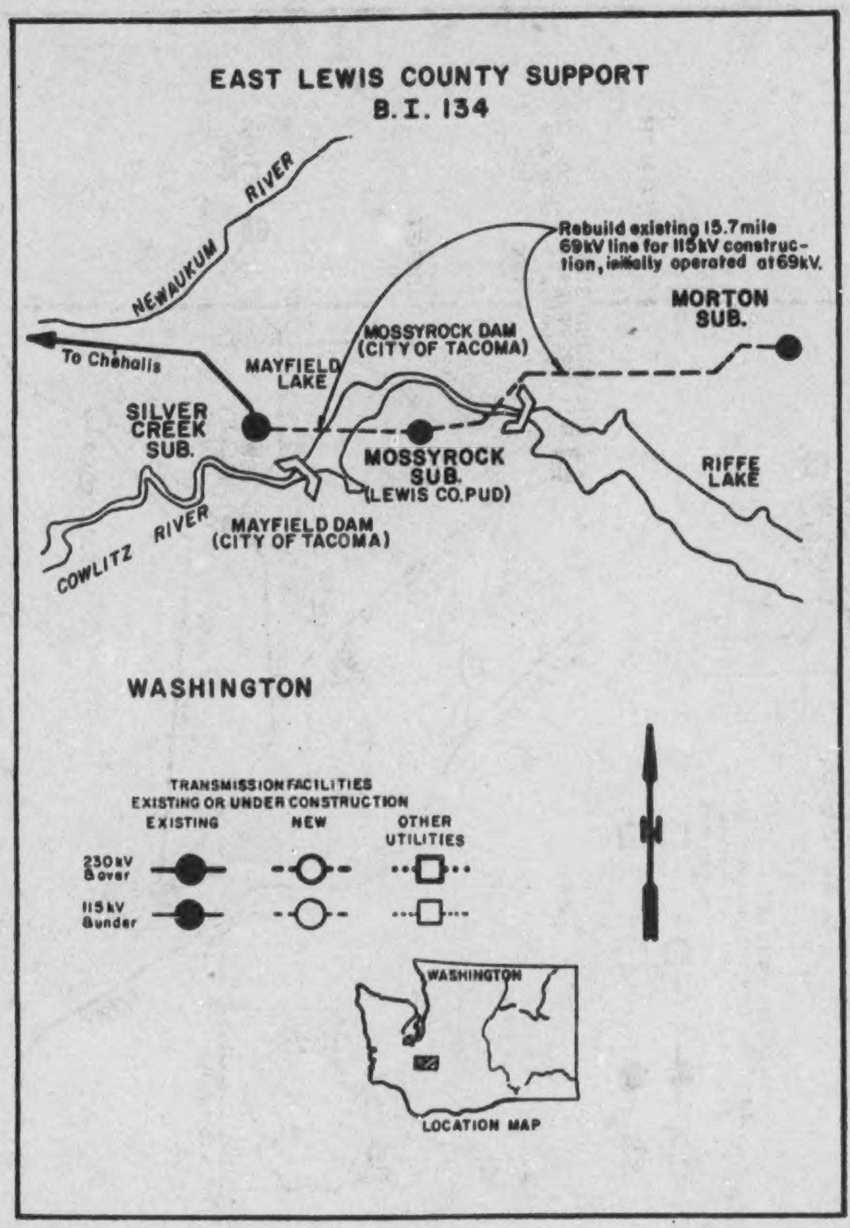
This item provides for BPA's financial participation in the research and development activities of the Electric Power Research Institute (EPRI). EPRI was established by public and private utilities to develop a coordinated national electric power research and development program. EPRI funding is provided by approximately 600 participating utilities nationwide, with individual utility contributions determined by a formula based upon energy deliveries. Financial participation in EPRI complements BPA's in-house research and development program. The funding levels in each of FY 1983 and FY 1984 are continued at the FY 1982 level of $7,700,000.

PORT ANGELES SYSTEM REINFORCEMENT
B.I.132


WASHINGTON
LOCATION MAP
PORT ANGELES SUB.
230/115 kV 300 MVA transformer
230 kV
To SAPPHO SUB.
27 miles 230 kV double circuit (Replaces existing 230 kV)
HAPPY VALLEY SUB.
FAIRMOUNT SUB.
2-115 kV
2-230 kV
DUCKABUSH SUB.
POTLATCH SUB.
N
JOHNS PRAIRIE SUB.
SHELTON SUB.
TRANSMISSION FACILITIES EXISTING OR UNDER CONSTRUCTION
EXISTING
NEW
OTHER UTILITIES
230 kV & over
115 kV & under

CENTRALIA REINFORCEMENT
B.I.133

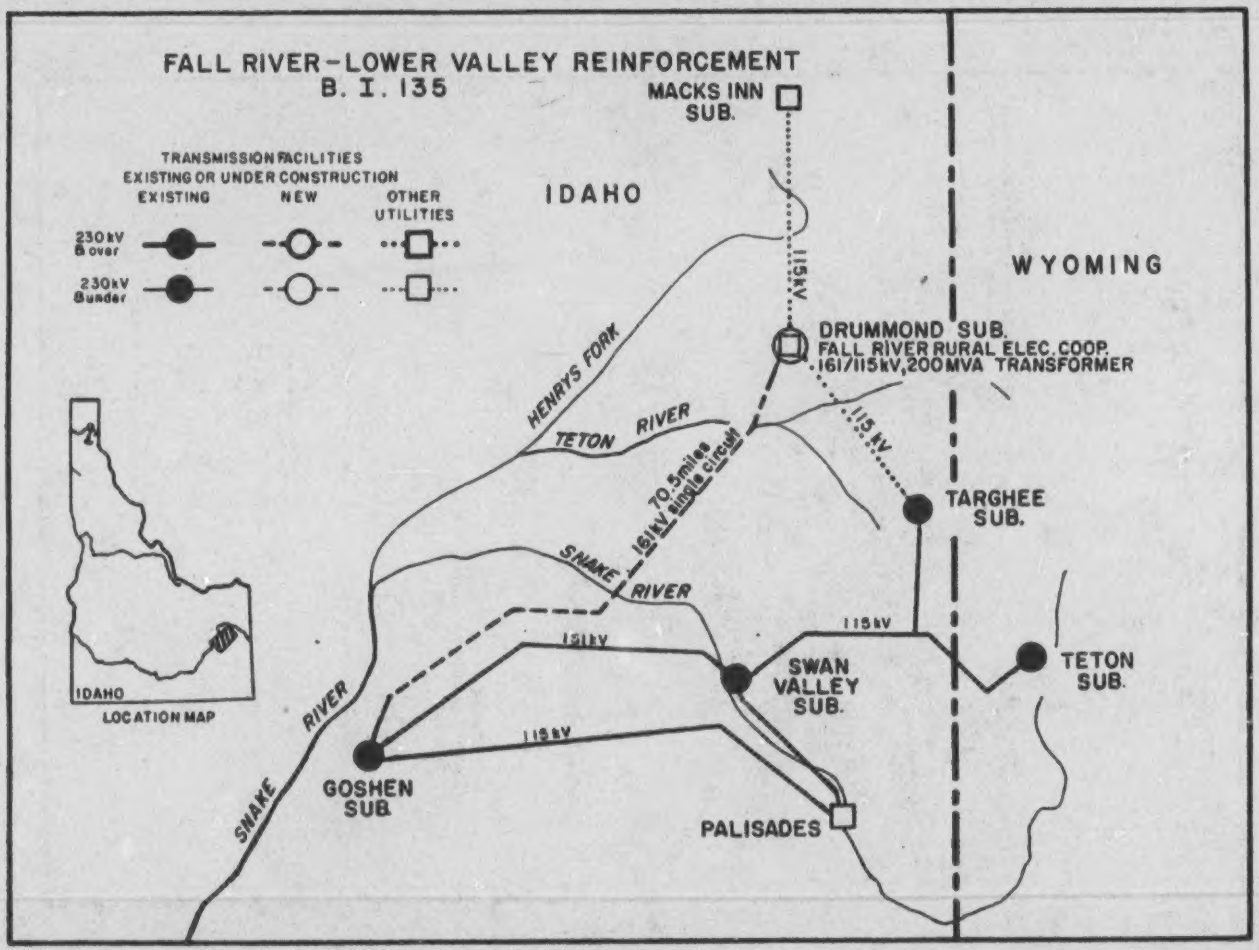

TO OLYMPIA SUB.
LOCATION MAP
WASHINGTON
FORDS PRAIRIE SUB.
230 kV
69 kV 3.1 MILE
CENTRALIA SUB.
230-69kV 200MVA transformer
1.8 miles, rebuild 69kV wood single circuit to two wood single circuit.
.2mi.
.2mi
SCAMMON SUB.
230 kV
69 kV
TO CHEHALIS SUB.
N
TRANSMISSION FACILITIES EXISTING OR UNDER CONSTRUCTION
EXISTING
NEW
OTHER UTILITIES
230 kV & over
115 kV & under



EAST LEWIS COUNTY SUPPORT
B.I. 134

NEWAUKUM RIVER
Rebuild existing 15.7 mile 69kV line for 115kV construction, initially operated at 69kV.
MORTON SUB.
MOSSYROCK DAM (CITY OF TACOMA)
To Chehalis
MAYFIELD LAKE
SILVER CREEK SUB.
MOSSYROCK SUB. (LEWIS CO. PUD)
RIFFE LAKE
COWLITZ RIVER
MAYFIELD DAM (CITY OF TACOMA)
WASHINGTON
TRANSMISSION FACILITIES EXISTING OR UNDER CONSTRUCTION
EXISTING
NEW
OTHER UTILITIES
230kV & over
115kV & under
N
WASHINGTON
LOCATION MAP

FALL RIVER-LOWER VALLEY REINFORCEMENT
B. I. 135


MACKS INN SUB.
TRANSMISSION FACILITIES
EXISTING OR UNDER CONSTRUCTION
EXISTING
NEW
OTHER UTILITIES
230kV & over
230kV & under
IDAHO
WYOMING
115kV
DRUMMOND SUB.
FALL RIVER RURAL ELEC. COOP.
161/115kV, 200MVA TRANSFORMER
HENRYS FORK
TETON RIVER
115 kV
70.5miles 161kV single circuit
TARGHEE SUB.
SNAKE RIVER
115kV
161kV
SWAN VALLEY SUB.
TETON SUB.
115kV
GOSHEN SUB.
PALISADES
SNAKE RIVER
IDAHO
LOCATION MAP

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

OPERATION AND MAINTENANCE SUMMARY

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
System Operation	25,126	30,027	34,477
System Maintenance	54,356	65,500	76,960
Power Scheduling	2,899	3,700	4,400
Power Marketing	9,244	13,500	15,200
Fish and Wildlife	4,661	10,200	26,100
Planning Council	5,782	6,073	6,063
TOTAL	102,068	129,000	163,200

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SYSTEM OPERATIONS

System operations $34,477,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
1. Substation operations	18,329	22,177	25,267
2. Power system control and dispatching	5,860	6,750	7,930
3. Operations standards and engineering	937	1,100	1,280
Total	25,126	30,027	34,477

1. Substation operations $25,267,000

This activity will, as in FY 1982 and FY 1983, consist of performing functions necessary to provide electric service to customers and to protect the Government's investment in electric equipment. In FY 1984, this activity will provide for the operation of 377 substations versus that of 371 in FY 1983.

Ongoing operational work associated with the substations will include making adjustments to maintain loads and voltages within acceptable limits, switching to de-energize lines and equipment during emergencies for maintenance, isolating damaged equipment, restoring service to customers, visual inspection of equipment, reading meters, and recording line and equipment loadings and voltages. Security and certain caretaking functions at substations are also included in this activity.

2. Power system control and dispatching $7,930,000

This activity will continue to focus in FY 1984 (as FY 1982 and FY 1983) on the central control of the electric operation of the Federal transmission system including load, frequency, and voltage control of Federal generating plants, the operation of the system control and data acquisition computers at the Dittmer System Control Center, and the modification and maintenance of the operation-related computers (e.g., computer terminal equipment, computer programs). Increased emphasis is to be placed on the lease of communication facilities used for telemetering, load frequency control, and for communication with dispatchers of other utilities and generating plants; the dispatching of power over the Federal transmission system; and coordinating the operation of the power system with other interconnected systems.

3. Operations standards and engineering $1,280,000

This effort in FY 1984, as in FY 1982 and FY 1983, will include tests and studies of the power and reactive flows and voltages on the transmission system for a variety of operating conditions during the year, review of power system disturbances, and establishment of criteria for operating under expected conditions for the next operating year. Also included will be investigations of emergency operation programs, review of substation manning standards, and supervision of the operation of BPA's power transmission system.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SYSTEM MAINTENANCE

System maintenance $76,960,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
1. Transmission lines	14,546	18,410	22,230
2. Substations	15,426	17,670	20,710
3. System protection	6,379	7,080	8,250
4. Power system control equipment	8,149	10,050	11,530
5. Buildings, grounds, other maintenance services	5,379	6,570	7,700
6. Maintenance standards and engineering	4,477	5,720	6,540
Total	54,356	65,500	76,960

1. Transmission lines $22,230,000

The transmission line maintenance program for FY 1984 will continue to emphasize (as in FY 1982 and FY 1983) the patrol and maintenance of approximately 14,000 circuit-miles of transmission lines throughout the power grid system, as well as performing emergency repairs to the transmission lines and structures. An enhanced emphasis will be placed on wood-pole preservation treatment, brush and weed control, access road maintenance, and danger-tree removal in FY 1984 over that of FY 1983.

2. Substations $20,710,000

This activity will provide for the continued maintenance of substation facilities and related equipment (e.g., circuit breakers, transformers, switches, etc.) in FY 1984. There is to be a concerted effort in FY 1984 over FY 1982 and FY 1983 to provide special materials as well as handling guidelines required to reclaim used oil from transformers and circuit breakers as well as the purchase and installation of gear operators on disconnect switches.

3. System protection $8,250,000

The FY 1984 thrust will parallel that of FY 1982 and FY 1983 in the continued maintenance of all control systems be they digital-based systems, d-c control systems, power system relays to insure no increase in customer outage rates, or major equipment damages. The activity will place increased emphasis on the maintaining of meters necessary to operate the power supply system and record functional demand data.

4. Power system control equipment $11,530,000

This activity in FY 1984 will maintain all power line carrier, radio, digital, and submultiplex systems and microwave equipment as done in FY 1982 and FY 1983. Funding levels are slightly higher in FY 1984 to provide the necessary support in corrective maintenance throughout the entire electrical system.

5. Buildings, grounds, and other maintenance services $7,700,000

The thrust for FY 1984 is to continue, as in FY 1982 and FY 1983, the basic maintenance functions (e.g., site, building, and building utility maintenance; custodial services; station utility; and transportation maintenance) on BPA-owned or leased nonelectric facilities associated with the electric transmission system.

The slight increase in funding between FY 1984 and FY 1983 will be the result of increased costs for building site security, janitorial services, and building repair activities.

6. Maintenance standards and engineering $6,540,000

As in FY 1982 and FY 1983, FY 1984 will tend to concentrate on the development and establishment of standards, policies, and procedures for system maintenance, along with the development, review, coordination, and implementation of State-wide, long-range maintenance planning. The moderate increase between FY 1983 and FY 1984 provides for more intensive efforts in long-range maintenance planning.

In summary, while most of BPA's system maintenance program for FY 1984 continues to be based upon a philosophy of providing preventive or corrective maintenance to electrical equipment, a greater portion is to be on a failure-repair or replacement basis of emergency-type maintenance. While the growth of the maintenance program has been restrained through extending the time between scheduled maintenance, there is still an increase in the growth of the system itself. A somewhat greater rate of failure of aging equipment is expected, due in part to reduced maintenance in the past. As a consequence, an increase is found in the system maintenance activity overall for FY 1984.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

POWER SCHEDULING

Power scheduling $4,400,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
Power scheduling	2,899	3,700	4,400

As in FY 1982 and to a greater extent in FY 1983, FY 1984 power scheduling activities will consist of forecasting, on a short-term basis, the hourly power requirements of BPA customers and the interchange of power with other utilities and then scheduling the power to be generated at each Federal plant to meet designated customer need. Major emphasis will focus on weather and streamflow forecasting, controlling the storage and utilization of water in the reservoirs, and coordination of power production with the multipurpose operation of the Columbia River and related intertie system.

FY 1984 funding reflects enhanced contract requirements in power production and forecasting.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

POWER MARKETING

Power marketing $15,200,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
1. Power contracts and rates	4,059	4,270	5,410
2. Customer service	2,097	2,420	3,140
3. Special coordination	3,088	6,810	6,650
Total	9,244	13,500	15,200

1. Power contracts and rates $5,410,000

In FY 1984, as in FY 1983 and to a greater extent than in FY 1982, emphasis on power contracts will continue to be placed on the drafting, negotiation, administration, and oversight of contracts for power sales, exchange, conservation, wheeling, and billing credits. Development of marketing policy and the marketing of surplus power, residential exchange studies, and statistical analysis of delivery and transmission of power will continue. Power contract preparation, customer negotiation, policy analysis, and approving of power sales contracts (on transfer, transmission, lease and trust fund agreements) will be continued at a level of effort consistent with FY 1983. FY 1984 will continue to concentrate on BPA rate development and analysis activity at an equivalent level of effort as demonstrated over the past fiscal year.

Rate activities, which consist of the development of BPA's power and wheeling rates, review of customer utility retail rates to ensure reasonable and nondiscriminatory rates and development of revenue studies for use in setting rates adequate to cover BPA's operating expenses, debt repayment, and amortization of the Federal investment in the Federal Columbia River Power System hydroelectric projects, will continue in FY 1984. Additional ratemaking activities resulting from the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) are to include developmental work in preparation for the 1985 implementation of Section 7(b)(2): preference customer rate test; and Section 7(b)(3): accounting of overrecovery/underrecovery of residential exchange costs. Evaluation of customer utility retail rate structures designed to encourage conservation and the development of renewable resources, and development of a billing credit structure for such customers, will continue to be addressed. BPA will assist customers and the Pacific Northwest Electric Power and Conservation Planning Council in modifying retail rate structures in order to encourage conservation and the development of renewable resources.

2. Customer service $3,140,000

As in FY 1982, and with greater emphasis in FY 1983, FY 1984 will accentuate the need to work on the application of transmission and customer service policies, development of standards for service plans along with the preparation, review, and clearance of such service plans and appropriate negotiations with customers to ensure adequate coordination for electric facilities to better service their client base. Rate studies, sales statistics, and load-estimating criteria will continue to be developed and implemented by area and district office customer service staff in FY 1984.

3. Special coordination $6,650,000

Special coordination thrusts increased from FY 1982 to FY 1983 as the result of mounting efforts generated by the Regional Act impacting environmental data preparation; analysis and evaluation in support of the Administrator's resource acquisition programs; and increased public/citizen involvement projects that allow customers and ratepayers to provide valuable input into BPA's planning and policymaking.

In FY 1984, program emphasis will concentrate on environmental analysis and review of the Regional Council's adopted Fish and Wildlife program, along with the Council's Energy Plan. The public involvement program will continue to provide opportunities for increasing public awareness and participation through BPA's target audience concerning its (BPA) complex power programs.

FY 1984 funding requested reflects the to-be-completed efforts in environmental analysis in support of energy conservation programs and those public involvement activities based on the adoption of the Regional Council's fish program.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

FISH AND WILDLIFE

Fish and wildlife $26,100,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
Fish and wildlife	4,661	10,200	26,100

BPA's fish and wildlife responsibilities are expected to be substantially expanded as the result of implementation of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act - P.L. 96-501) beyond the Agency's anadromous fish restoration effort originally undertaken pursuant to the Memorandum of Understanding of November 29, 1976, between the BPA Administrator; the Governors of Idaho, Washington, and Oregon; the Federal co-chairman of the Pacific Northwest Regional Commission; and tribal representatives. BPA's expanded authority now includes the funding of activities that protect, mitigate, and enhance fish and wildlife resources affected by the operation and development of hydroelectric generating facilities on the Columbia River and its tributaries.

In FY 1982 emphasis was placed on those research activities that addressed habitat improvements, radio tracking, and development of new concepts in fish ladder design. In addition, studies on feeding activity, daily ration, and prey selection of major predators at varied dam sites were conducted as were those to restore and enhance anadromous salmonid populations within the confederated tribes of the Umatilla reservation.

In November 1982, the Northwest Power Planning Council adopted its Columbia River Basin Fish and Wildlife program [Section 4(h) of P.L. 96-501]. BPA activities, to be undertaken during FY 1983, will be directed at the implementation of this program. Among these projects will be the study of the migrational characteristics of juvenile salmon and steelhead where data is gathered in the Columbia River estuary to determine the relationship between the survival rate of migrating juveniles under varying river flows and river conditions. A tag-recovery project is to be implemented to gather data on survival rates of migrating salmon, the effects of different fish release techniques on survival rates, and the effects of different hatchery nutrition and disease control methods. Additional projects scheduled for FY 1983 include the study of water flows on the behavior of migrating fish, predator-prey relationships in reservoirs and as they affect anadromous fish, and the design of juvenile salmon and steelhead release facilities and adult collection facilities.

Activities to be funded in FY 1984 include research, design, and development projects, which address problems affecting the Columbia River basin's salmon and steelhead, resident fish, and wildlife resources, and which are to be included in the Pacific Northwest Electric Power and Conservation Planning Council's Fish and Wildlife program.

The major emphasis in FY 1984 is to be directed towards improving survival of juvenile and adult salmon and steelhead at and between hydroelectric facilities on the Columbia River system, and includes the provision of sufficient quality and quantity of water to achieve improved survival. While agencies such as the Army Corps of Engineers (COE) direct their funding at project-specific problems (e.g., improved bypass/collection facilities at COE dams), BPA's involvement is directed at system-oriented problems. For salmon and steelhead these will include: evaluation of various levels of flows provided to assist juvenile migrants moving to the ocean, transportation of juveniles from hatcheries directly to the estuary, improved quality of hatchery-reared fish, predator-prey interactions and relationships, the investigation of the feasibility of low-cost salmon production facilities, interactions and relationships between naturally produced and artificially reared juvenile salmon and steelhead, and various habitat restoration projects. Projects will be identified through solicitations and invitations to bid, with funds being provided to the region's Federal and State fish and wildlife agencies, Indian tribes, universities, consultants, and other qualified groups and organizations.

Additional emphasis is to be placed in the area of resident fish and wildlife protection, mitigation, and enhancement activities. These are to include, for example: continuation of ongoing studies evaluating the effect of reservoir and stream fluctuations on resident fish, and baseline data gathering on streams that are currently undeveloped, but are proposed for future hydroelectric development. Wildlife studies initiated will determine: the impacts of river operations on migrating waterfowl and big game, activities to improve and stabilize riparian habitat impacted by fluctuating reservoirs, and measures to fully mitigate or enhance wildlife populations displaced by hydroelectric development and operation.

A significant effort will further be undertaken relative to the coordination of funding activities with traditional fish and wildlife funding sources. These efforts will be aimed at assuring BPA that ratepayer funds are not replacing expenditures that are required of others; that projects funded are not duplicating other ongoing activities; that projects initiated reflect the highest priority fish and wildlife needs; and, that the proposing agency, tribe, or researcher is qualified to undertake a specific activity.

The Fish and Wildlife program for FY 1984 requires $26,100,000. and includes additional activities which BPA anticipates will be undertaken as the result of adoption of the Council's Fish and Wildlife program.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

PACIFIC NORTHWEST ELECTRIC POWER AND CONSERVATION PLANNING COUNCIL

Planning Council $6,063,000

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
Planning Council	$5,782	$6,073	$6,063

Creation of the Pacific Northwest Electric Power and Conservation Planning Council (Council) was authorized by passage of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) on December 5, 1980.

The Council was formally established on April 28, 1981, its principal responsibility being the preparation and adoption of a Regional Conservation and Electric Power Plan within 2 years of the Council being established (by April 28, 1983). Among other elements, the Plan will include an energy conservation program, a regional 20-year demand forecast, a forecast of needed resources, and a program to protect, mitigate, and enhance fish and wildlife. The Planning Council consists of eight members, two appointed by each of the four Pacific Northwest Governors (Idaho, Montana, Oregon, and Washington), and supported in FY 1984 by a central staff of 35 employees, and State support staff of 14 employees.

With its establishment in 1981, the Council initially concentrated on organizational matters, personnel recruitment, public involvement, and the preparation of a work plan. The Council has received and continues to receive informational briefings in public hearings throughout the Pacific Northwest on such topics as load forecasting, fish and wildlife, conservation, renewable resources, power system operations, and conventional energy resources.

In FY 1982 Council activities focused on the development and preparation of the Energy Plan and the Fish and Wildlife program. The bulk of the Council's work effort was performed by consultant/contractors under the management of its professional staff. Public information and public involvement plans were initiated in response to the mandated requirements of P.L. 96-501. FY 1983 will involve the preparation of the final Fish and Wildlife program plan and its adoption (November 1982), and public hearings on the draft Energy Plan, the final version of which is expected to be adopted in April 1983.

In FY 1984 the Council will devote significant effort to monitoring and evaluating the Fish and Wildlife program and the Regional Energy Plan; developing revisions and amendments to the Fish and Wildlife program based on additional research and study results; and revising and amending the Energy Plan based on perfecting the original Plan and on adjustments in forecasting, conservation, reserves and reliability, and resource assessment. The Council must present an annual report to Congress each October 1. BPA, BPA's customers, fish and wildlife agencies, and Indian tribes have a chance to comment on drafts of these reports.

Funding for the Council is provided by BPA (and is recoverable from BPA rates), not by the Federal treasury or by any State government in the region. The Regional Act directs that expenses of the Council (subject to certain limits) shall be included in BPA's annual budget submitted to Congress pursuant to the Federal Columbia River Transmission System Act. The limits are based on the kilowatthours of firm power forecasted to be sold by BPA.

The Regional Act provides that BPA may raise the lower .02 mill per kilowatthour ceiling and pay Council expenses up to an annual amount not to exceed .10 mill per kilowatthour upon a showing by the Council that the funds in excess of the lower ceiling are needed to enable the Council to carry out its functions and responsibilities under the Regional Act. The Council asserts that its current budget and accompanying documents represent such a showing. The BPA Administrator has reviewed the Council's budget for FY 1984 and its revised budget for FY 1983 and concludes that they meet the test of the Regional Act. He does not find them to be unreasonable. Based on BPA's latest firm power sales forecasts, the $6,073,000 revised budget proposed by the Council for FY 1983 represents approximately .062 mill per kilowatthour and the $6,063,000 budget for FY 1984 translates into approximately .059 mill per kilowatthour.

The slight decrease in fund requirements between the revised FY 1983 budget and the FY 1984 budget is primarily the result of a reduction in contract efforts which is offset by increases in the State allocations for Council-member support. The decrease in the mill per kilowatthour is based on the fact that forecasted firm energy sales for FY 1984 exceed that for FY 1983.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

REIMBURSABLE

	FY 1982 Actual Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
1. Hanford Generating Project	24,446	45,175	34,400
2. Interruptible replacement energy	3,595	33,325	51,000
3. WNP-4/5 escrow agreement	60,610	---	---
4. Work done for others	7,619	10,000	10,000
Total	96,270	88,500	95,400

1. Hanford Generating Project $34,400,000

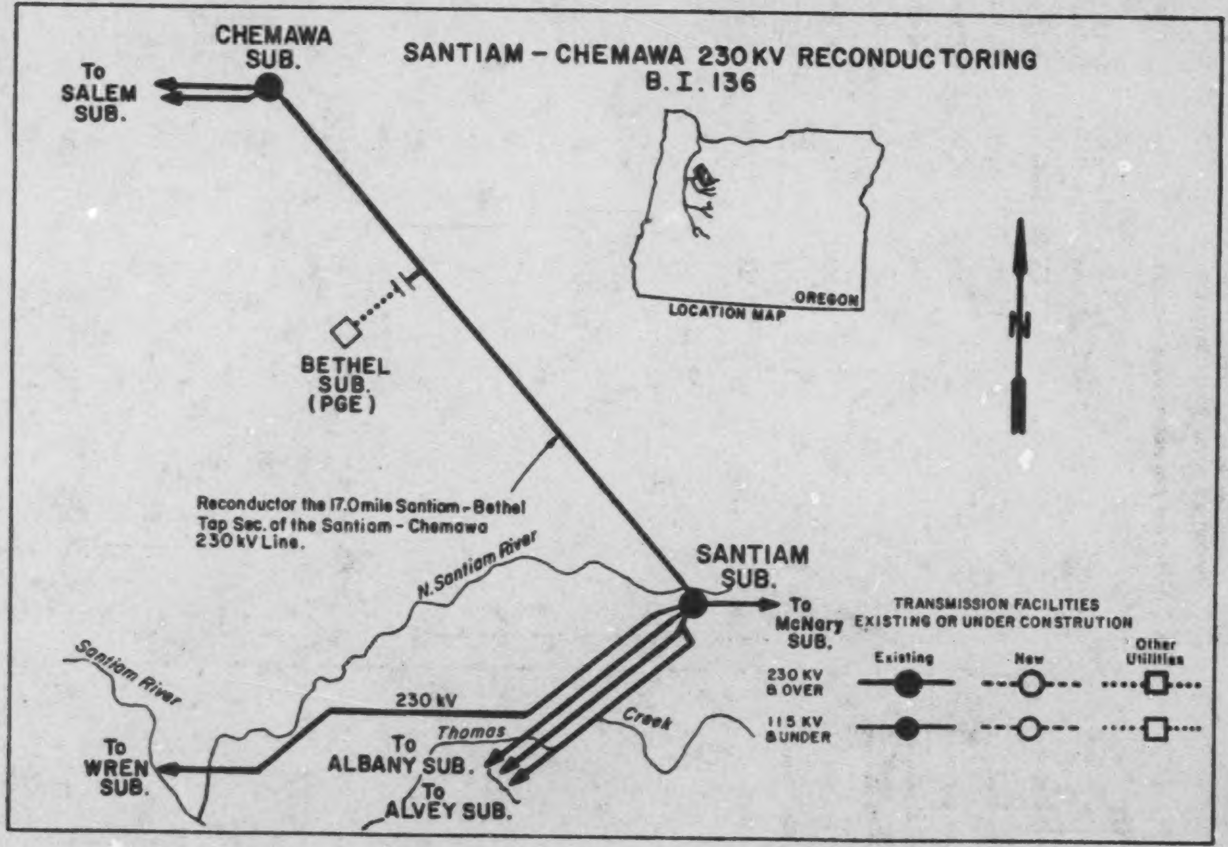
Under the terms of contracts in effect through June 30, 1983, Hanford Generating Project (HGP) output is shared equally by investor-owned utilities and BPA's direct-service industrial customers (DSI), with BPA and its preference customer participants in HGP retaining the right to withdraw the power from the industries in any operating year (July 1 through June 30). For the 1981-82 operating year, BPA withdrew the public agencies' share of HGP output from the industries and used the output to meet firm energy commitments. For the 1982-83 operating year, BPA did not withdraw so the DSI's will receive HGP output.

In July 1982, the Washington Public Power Supply System (Supply System) and the Department of Energy (DOE) executed a new contract (Hanford Steam Energy Agreement) providing for the Supply System's purchase of byproduct steam from DOE's N Reactor. This contract is effective June 30, 1983, through June 30, 1993, and effects an extension of the current contracts which terminate on June 30, 1983. Additionally, BPA and the Supply System executed a contract in July 1982 providing for the continued operation of HGP and funding for the project. Fifty percent of the output of HGP will continue to be exchanged with the public agency participants. Pursuant to the legislation for the N Reactor project and in accordance with agreements reached in 1974, the other 50 percent of HGP output will continue to be offered to the five investor-owned utility participants at project costs. It is currently anticipated that the DSI's will not be offered an assignment of the public agency participants' share under the new contract. The BPA/Supply System contract is effective on June 30, 1983, and terminates when the Hanford Steam Energy Agreement terminates.

The public agency participants pay their share of HGP costs through an exchange power process. The Resource Acquisition, Planning, and Oversight section of this document contains these costs. Under the existing agreements, the investor-owned utility participants and the DSI's pay their share of HGP costs through trust fund arrangements. The investor-owned utilities will continue paying their share of HGP costs through trust fund arrangements under contracts for the continued operation of HGP past 1983. Those costs are included in this section.

2. Interruptible replacement energy $51,000,000

Any required replacement energy purchase transactions on a week-to-week basis for BPA's direct-service industrial customers are handled through energy purchase trust agreements. If BPA restricts service to the upper quartile of the DSI loads due to low water conditions, available energy supply, or other reasons consistent with the contractual provisions, BPA assists the DSI's in the purchase of energy to replace that curtailed. The cost is passed through to the DSI's. The total amount reflects BPA's estimate under adverse conditions.



SANTIAM - CHEMAWA 230KV RECONDUCTORING
B.I. 136

Reconductor the 17.0 mile Santiam - Bethel Tap Sec. of the Santiam - Chemawa 230 kV Line.

CHEMAWA SUB.
To SALEM SUB.
BETHEL SUB. (PGE)
LOCATION MAP
OREGON
N
SANTIAM SUB.
To McNary SUB.
N. Santiam River
Santiam River
230 kV
Thomas
Creek
To WREN SUB.
To ALBANY SUB.
To ALVEY SUB.
TRANSMISSION FACILITIES EXISTING OR UNDER CONSTRUTION
Existing
New
Other Utilities
230 KV & OVER
115 KV & UNDER

3. WNP-4/5 escrow agreement .... $ —

On June 18, 1981, the Supply System Board of Directors authorized a construction slowdown on WNP-4 and WNP-5. Reasons for the slowdown were uncertainty regarding the Supply System's ability to finance continued construction of the projects and uncertainty concerning the need for the capability of the projects. This precipitated the creation of a commission established by Governors Spellman of Washington and Atiyeh of Oregon. The recommendation of the commission was to preserve the assets of WNP-4 and WNP-5 until the newly formed Pacific Northwest Electric Power and Conservation Planning Council completes the Regional Plan and a determination is made as to the need for and timing of the power which the plants would generate.

After lengthy negotiations, the participants in WNP-4 and WNP-5 and other regional utilities and direct-service industries responded to the recommendation of the Governors' Panel and agreed that the projects should be delayed for an extended period of time rather than terminated.

BPA accepted the request to be an escrow agent for the parties who would provide funds for the extended construction delay on WNP-4 and WNP-5. The escrow agreement did not commit BPA to future involvement, acquisition, or oversight by BPA of the administration or management of WNP-4 and WNP-5. As escrow agent, BPA had no discretion in implementing the agreement. Its responsibility was limited to the receipt of loan agreements, the receipt of moneys from the participants in the extended construction delay plan, and the disbursement of those moneys upon certification of the Supply System Managing Director. There was no cost to BPA as the agreement provided for reimbursement of BPA's reasonable costs incurred in acting as escrow agent.

The escrow agreement was to be in three phases. The first two phases were $30 million loans by the participants in both November and December 1981 to cover the early shutdown costs. These loans were paid to BPA in those months and were disbursed to the Supply System as needed. After the Supply System Board of Directors terminated the two projects on January 22, 1982, the third phase, which would have provided $90 million for the longer-term delay costs, was not required.

BPA's relationship with the participants in the program led to its selection as the Regional entity best suited to carry out the responsibilities of this escrow agreement. The agreement provided for BPA to act in a manner similar to that provided for in numerous other trust-type agreements under which it has operated for many years.

4. Work done for others $10,000,000

BPA constructs, operates, and maintains transmission facilities, which are not provided by BPA under its customer service policy, when requested and financed by other entities. These facilities increase efficiency on the system, reduce loads on existing facilities, and improve service to customers. Also, BPA facilities are relocated as required for highway construction and other purposes under similar arrangements. Funding for this item is provided by benefiting entities on a trust or reimbursable basis.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

INTEREST EXPENSE FROM BORROWINGS

Interest expense from borrowings $155,900,000

	FY 1982 Estimate Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
Interest expense from borrowings	85,526	109,900	155,900

This item covers the payment of interest to the U.S. Treasury on borrowings to finance BPA's construction and energy conservation programs. The Federal Columbia River Transmission System Act, as amended by the Regional Act, provides borrowing authority of $2.5 billion to assist in financing the construction, acquisition, and replacement of the transmission system and to implement the Administrator's authority pursuant to the Regional Act, including his authority to provide financial assistance for conservation measures, renewable resources, and fish and wildlife.

The FY 1984 amount of $155.9 million in interest is an increase over FY 1983 and reflects interest on additional borrowings to finance both the construction and energy conservation programs.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

ASSOCIATED PROJECT COSTS

Associated project costs $100,000,000

	FY 1982 Estimate Obs	FY 1983 Estimate Obs/BO	FY 1984 Estimate Obs/BO
	(in thousands of dollars)		
1. Bureau of Reclamation	31,739	39,400	43,000
2. Corps of Engineers	44,507	49,900	54,400
3. Federal Energy Regulatory Commission Coordination agreement	2,727	2,600	2,600
Total	78,973	91,900	100,000

1. Bureau of Reclamation $43,000,000

This item includes payments to the Reclamation Fund covering the costs of operation and maintenance, interest, and amortization of Bureau of Reclamation projects allocated to be repaid from BPA revenues.

2. Corps of Engineers operation and maintenance expense $54,400,000

This item covers payments to the General Fund of the Treasury covering the O&M costs of Corps of Engineers generating projects repayable from BPA revenues. (Payments also are made to the Treasury from BPA revenues for interest and amortization of the power investment in the Corps of Engineers projects, but these are treated as Capital Transfers and do not appear in this item.)

3. Federal Energy Regulatory Commission Coordination agreement $2,600,000

This item includes payments to the General Fund of the Treasury which the Federal Energy Regulatory Commission determines are due the Federal Government pursuant to Section 10(f) of the Federal Power Act for downstream benefits realized at non-Federal hydroelectric projects as a result of storage releases from upstream Federal reservoirs. The payments are made in accordance with the Pacific Northwest Coordination Agreement and are credited to the Corps of Engineers and Bureau of Reclamation accounts in relationship to the amount each agency's projects have benefited the downstream owners.

DEPARTMENT OF ENERGY
FY 1984 Congressional Budget

PENDING LITIGATION
Bonneville Power Administration

Columbia Basin Land Protection Assn., et al. v. Hodel, et al., U.S. District Court, Eastern District of Washington, No. C76-6, filed January 12, 1976

This litigation challenged the right of BPA to build the Lower Monumental-Ashe 500-kV line, the purpose of which is to transmit power to be generated at nine units being installed in hydroelectric projects located along the Lower Snake River. In all issues in this case, such as adequacy of BPA's environmental impact statement (EIS), whether the line routing decision was arbitrary and capricious, the necessity for complying with local land-use regulations, whether an EIS was required for crossing Bureau of Reclamation administered land, and whether the Federal Land Policy Management Act permit obligated BPA to meet substantive siting standards of the State of Washington that are more stringent than those of BPA, the Ninth Circuit Court of Appeals held for BPA except the one relating to compliance with State of Washington standards, and returned the case to the District Court. The matter is now under study by the United States Attorney.

The transmission line has been constructed and energized and any further action that may be required by the court decision will have no adverse effect on BPA's financial situation.

Forelaws on Board, et al. v. Peter Johnson, et al., U.S. District Court, District of Oregon, No. 81-916, filed September 30, 1981

Plaintiffs allege that the power sales and residential exchange contracts offered by BPA to its customers pursuant to section 5 of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) constitute a major Federal action subject to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, et seq., and that BPA violated NEPA by failing to prepare an EIS on the issuance of the above-mentioned contracts. They also allege that contracts being offered or entered into for the exchange of power with IOU's, public entities, or other Federal agencies, likewise violate NEPA for the same reason. Plaintiffs seek to have all such contracts declared void and to enjoin BPA from performance of them. A motion has been filed by the Government to dismiss this case on the ground that the District Court lacks jurisdiction over a case that the Regional Act requires be brought in the Ninth Circuit Court of Appeals.

In the opinion of BPA General Counsel, there is no merit in the NEPA challenge because the contracts were issued pursuant to a congressional mandate in the Regional Act which overrides the question of NEPA compliance.

PACIFIC NORTHWEST ELECTRIC POWER PLANNING AND CONSERVATION ACT LITIGATION

Litigation Involving Contracts Offered to Customers on August 28, 1981

Central Lincoln Peoples' Utility District, et al. v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7561, filed September __, 1981, (referred to as "Central Lincoln I")

Plaintiffs allege that sections 7(c), 8(a)(2), 8(b), and 5(d) of BPA's initial contracts to direct-service industrial (DSI) customers under section 5(g)(1) of the Regional Act violated in several specifics the preference clause of the Bonneville Project Act, 16 U.S.C. 832c(a) and (b). Petitioners also alleged claims that the reserve provisions of these initial contracts violated section 3(17) and 5(d)(1)(A) of the Regional Act, that the Administrator acted arbitrarily and capriciously and beyond his jurisdiction in offering the initial contracts to DSI's which provided them a greater amount of power than their 1975 contracts, and that the initial contracts violate certain provisions in the Pacific Northwest Coordination Agreement. The petitioners' request for preliminary relief was denied by the court on September 10, 1981. Petitioners' briefs were filed on October 30, 1981, and the Government's responding brief was filed on November 13, 1981. Final reply briefs of petitioners were filed on November 20, 1981. The case is set for hearing by a regular panel of the Ninth Circuit in January 1982.

In the opinion of the BPA General Counsel, BPA should prevail in the litigation. In the event, however, that the court should find any specific sections of the contracts to be invalid and direct BPA to renegotiate them, the customers involved would be billed on the basis of the former contracts. This could have a short-term impact on BPA's financial standing until the renegotiations are completed.

The following cases have been filed by the major classes of BPA's customers to preserve the court's jurisdiction to adjudicate any rights that would remain unresolved in a decision in Central Lincoln I discussed above. These cases were filed immediately before expiration of the 90-day limitation in section 9(e)(5) of the Regional Act, after which judicial challenge to the contracts offered by BPA to its customers would be barred. The Forelaws on Board case discussed above was filed in the context of the following litigation but since it involves primarily environmental issues it was listed under that heading.

Public Power Council, et al. v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7806, filed December 3, 1981

The plaintiffs, BPA's publicly owned utility customers, allege that the contracts offered by BPA to this class of customers violate the rights accorded to them by the statutes relating to BPA's contracting authority as they apply to the plaintiffs.

Aluminum Company of America, et al. v. Bonneville Power Administration, U.S. Court of Appeals, Ninth Circuit, No. 81-7813, filed December 4, 1981

The plaintiffs, BPA's DSI customers, allege that BPA failed to interpret reasonably the applicable statutory provisions of the Regional Act.

Pacific Power & Light Company, et al. v. James Edwards, Secretary, U.S. Dept. of Energy and Peter Johnson, Administrator of BPA, No. 81-7803, filed December 8, 1981

Plaintiffs, BPA's investor-owned utility (IOU) customers, allege that BPA interpreted and applied in the contracts offered to these customers sections 5 and 7 of the Regional Act with the result that they incur net costs in a manner contrary to those sections.

Boise Cascade Corporation v. Bonneville Power Administration, U.S. Court of Appeals, Ninth Circuit, No. 81-7802, filed December 1, 1981

Petitioner, as an indirect customer of BPA through the Columbia River Peoples' Utility District, alleges that several provisions of the contract offered by BPA to that district violate and fail to interpret reasonably applicable statutory provisions of the Regional Act. It seeks review of the final action of BPA in offering the contract.

California Energy Resources Conservation and Development Commission v. Peter Johnson, U.S. Court of Appeals, Ninth Circuit, No. 81-7809, filed December 4, 1981

Plaintiff contends that certain parts of paragraph 8 of the BPA General Contract Provisions in its newly issued power sales contracts are illegal, and thus void, because they (1) bind BPA to a particular method of wholesale power ratemaking without complying with the Regional Act, (2) result in the California utilities being charged a higher rate for nonfirm surplus energy, (3) limit BPA sales outside the region to surplus energy and surplus peaking capacity, thereby perpetuating the "Northwest priority," and (4) require return of energy delivered in connection with BPA sales of peaking capacity in California to BPA if it has a demand for such energy at any established BPA rate. Plaintiffs also allege that since Residential Exchange Contract Provision 4 can result in increasing BPA's cost of service and, as a consequence, the rates paid by California purchasers, it is invalid as violating the requirements of the Regional Act that BPA acquire only those resources that are cost effective.

National Wildlife Federation, et al. v. Peter Johnson, U.S. Court of Appeals, Ninth Circuit, No. 81-7804, dated November 23, 1981

Plaintiffs allege that the new power sales contract offered by BPA to, and accepted by, Alumax violates the Regional Act and BPA failed to involve the public in the specific provisions of the Alumax contract. It also raises the issue whether BPA's decision to offer the contract to Alumax without preparing an EIS violates NEPA.

The plaintiffs have also filed on November 24, 1981, a similar complaint in the U.S. District Court, District of Oregon, No. 81-1097.

In the opinion of the BPA General Counsel, these cases do not present any substantive new issues beyond those advanced in Central Lincoln I, and the plaintiffs' positions should not be sustained.

Litigation Involving Rates

Central Lincoln Peoples' Utility District, et al. v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 7622, filed September 21, 1981, (referred to as "Central Lincoln II")

Plaintiffs, public preference customers of BPA, allege that BPA's Final Proposed 1981 Rates, adopted on June 24, 1981, (1) violate applicable statutory provisions in both the level and design of the rate schedules, and (2) defendants have denied plaintiffs meaningful due process and protection guaranteed by the Regional Act and the Administrative Procedures Act, primarily on the ground that the plaintiffs did not have an opportunity to comment on, or refute, the validity of the rates as finally proposed and approved on an interim basis. Plaintiffs seek an order (1) declaring the Final Proposed Rates invalid, (2) enjoining collection of revenues based on these rates, and (3) refund of any revenues collected allegedly in excess of the rate schedules allowed by law.

The plaintiffs in the following litigation have filed complaints to protect their rights as they may be affected by Central Lincoln II. On its own motion the court has consolidated all of the cases and has requested that the parties submit briefs on the question of whether the court has jurisdiction before Federal Energy Regulatory Commission (FERC) has finally approved the rates.

CP National Corporation, et al. v. Peter T. Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7628, filed September 23, 1981

The plaintiffs in the action are the IOU customers of BPA. They allege that the Administrator's Record of Decision of June 24, 1981, is unlawful, an abuse of discretion, and in excess of statutory jurisdiction, authority, and limitations, and that implementation of the Administrator's Record of Decision violates the Regional Act. They seek to have the court set aside the Administrator's Record of Decision, set aside the rates in that decision affecting them, and compel the Administrator to construe section 7 of the Regional Act in accordance with an order of the court.

John J. Lobdell, Public Utility Commissioner of Oregon, et al. v. Peter T. Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7629, filed September 23, 1981

Plaintiffs, public utilities commissions of the Pacific Northwest States, allege that the Administrator's Record of Decision unlawfully applies section 7 of the Regional Act and unlawfully gives preference to BPA's DSI customers at the expense of IOU residential, farm, and commercial customers. They also allege that rate increase cases pending before them which cannot be decided until the rates promulgated by BPA under the Regional Act are resolved. They seek an order declaring the Administrator's Record of Decision unlawful, an abuse of discretion, and in excess of statutory jurisdiction, setting aside Rate Order No. BPA-4, and compelling the Administrator to construe the Regional Act in accordance with an order to be issued by the court.

Aluminum Company of America, et al. v. Bonneville Power Administration, U.S. Court of Appeals, Ninth Circuit, No. 81-7632, filed September 22, 1981

The plaintiffs, DSI customers of BPA, filed a "Petition for Review and Complaint." They allege that the rates adopted by the Administrator are unlawful and state that this action was filed to preserve the jurisdiction of the court to review their claims.

Public Power Council v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7633, filed September 22, 1981

Plaintiff represents 113 publicly owned and consumer-owned electric utilities. They allege that the rate schedules adopted by the Administrator violate section 7 of the Regional Act, both as to the level of rates and design of rate structures, and the procedures adopted by the Administrator with respect to the 1981 rates do not meet the procedural standards of the Administrative Procedures Act. They seek an order declaring illegal the 1981 wholesale power rates and the procedures followed in adopting them, enjoining the Administrator from collecting revenues on the basis of those rates, and ordering him to prepare rate schedules consistent with section 7 of the Regional Act.

People of the State of California, et al. v. Peter T. Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7635, filed September 22, 1981

This is Petition for Review by the State of California Public Utilities Commission in which it seeks review of the 1981 rates insofar as they affect entities receiving power in California.

California Energy Resources Conservation and Development Commission v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7636, filed September 22, 1981

Plaintiff filed a "Petition for Review and/or Complaint" alleging that the BPA 1981 rates are unlawful and the rates actually charged by BPA since July 1, 1981, are likewise unlawful. They seek an order directing the Administrator to reformulate the 1981 wholesale power and transmission rates to conform with Federal Statutory directives and adopted ratemaking principles and within 10 days of such reformulation, refund to BPA customers any excess amounts found to have been unlawfully collected.

Department of Water and Power of the City of Los Angeles, et al. v. U.S. Department of Energy, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7637, filed September 24, 1981

Plaintiffs filed a "Petition for Review" alleging ambiguities in the judicial review provisions of section 9(e) of the Regional Act and, by filing the petition, seek to protect their rights to full judicial review of BPA's actions.

In the opinion of the BPA General Counsel, BPA should prevail on those issues having a significant impact on BPA's financial standing. If the court should find that BPA's rate structure is improper, any future rates will have to be structured to take into account any shortfall in BPA's income due to the court's decision.

KERR DAM PROJECT LITIGATION

The Montana Power Company v. City of Seattle, et al., U.S. District Court, Eastern District of Washington, No. 81-195, filed April 16, 1981

Plaintiff seeks to recover from the City of Seattle, several Public Utility Districts in the State of Washington and BPA a portion of the retroactive rent increase it was ordered to pay the Confederated Indian Tribes for use of their lands for the Kerr Dam project. Liability is alleged to be based on the Pacific Northwest Coordination Agreement. The FERC, in 1978, approved a settlement agreement wherein the plaintiffs would be liable for increased rental payment from $950,000 to $2.6 million, retroactive to May 20, 1975. Plaintiff sought to recover a portion of this cost from downstream beneficiaries but because of a previous Ninth Circuit Court of Appeals decision affirming the District Court which held for the defendants, who were substantially the same as in the present litigation, but before the FERC settlement order was issued. The plaintiff filed an amended complaint in which it states that it does not seek a money judgment against BPA but instead that BPA owes the plaintiff certain energy credits expressed in kilowatthours. The Government has filed a motion to dismiss the complaint as to BPA, contending that the proper jurisdiction is in the Court of Claims and failure to state a cause of action against BPA upon which the relief sought can be granted.

In the opinion of the BPA General Counsel, this litigation is without merit.

INITIATIVE NO. 394 LITIGATION

Continental Illinois National Bank and Trust Company of Chicago, et al. v. State of Washington, et al., U.S. District Court, Eastern District of Washington, No. _________, filed December __, 1981

On November 3, 1981, the voters of the State of Washington passed Initiative 394, which provides that no public body "may issue or sell bonds to finance the cost of construction or the cost of acquisition of a major public energy project, or any portion thereof, unless it has first obtained authority for the expenditures of the funds to be raised by the sale of bonds for that project at an election conducted in the manner provided in this chapter." The initiative also requires that a cost-effectiveness study of the major public energy project under consideration which shall be subject to public comment before the vote on the bond issue is held at the next statewide general election.

The Bond Fund Trustees for WPPSS Projects WNP-1, WNP-2, and WNP-3 have instituted this litigation challenging the constitutionality of the initiative. They allege that the initiative impairs the validity of the contracts between WPPSS and the bondholders and violates the supremacy clause of the U.S. Constitution. The defendants are the Governor, Attorney General, and Secretary of State for the State of Washington and the Benton County, Washington, Auditor.

The initiative, if not declared invalid, would have a very adverse effect on financing construction of these three net-billed projects. In the event a bond issue was not to be approved by the voters, it would require cessation of construction of the project involved. In the event the project(s) were terminated and as a result the bonds were to be declared immediately due and payable, BPA would have to increase its rates substantially to meet its obligations.

In the opinion of the BPA General Counsel, if the case is properly prosecuted, the plaintiffs in this litigation should prevail.

BONNEVILLE DAM LITIGATION AND CLAIMS

As the result of the relocation of the Town of North Bonneville because of construction of the second powerhouse at Bonneville Dam the relocated individuals and businesses have instituted litigation against the Corps of Engineers. One issue involves the right of the Town to be provided with additional land for future expansion. This matter has been referred by the U.S. District Court for the Western District of Washington to the State of Washington courts which has ruled in favor of the town. The other issue concerns the right of the Town to assess and collect a business and occupation tax on the powerhouse construction. This matter is still pending in Federal court. In the opinion of counsel for the Corps of Engineers both claims are without merit and even if the Town were successful on either or both issues, the economic viability of the project would not be affected and any costs that might be incurred in that eventuality will be capitalized and recovered through future power rates. In addition, the Town has sued the United States in the Court of Claims seeking to recover $15 million on account of various alleged delays by the Corps of Engineers associated with the relocation of the Town. These are variations of the pending claims described above. In the opinion of counsel for the Corps these claims are also without merit.

INDIAN TRIBAL CLAIMS

The Confederated Tribes of the Colville Indians and the Spokane Indian Tribes (the Tribes) have asserted claims in unspecified amounts arising from construction of the Grand Coulee and Chief Joseph Dam projects. In response to a request from Congress, a task force established by the Departments of the Interior and the Army has studied the claims. No basis for liability has been found but the Office of Management and Budget has suggested that the affected Federal agencies work with the Tribes to develop a proposal which will encourage their economic development, including assistance in securing an adequate supply of power for a proposed molybdenum mine at Mt. Tolman on the Colville reservation. It is currently expected that the resolution of this matter will not adversely affect FCRPS revenues. As to the loss of fisheries claim of the Colville Tribe, the Indian Claims Commission has proposed a settlement of approximately $3.5 million which the Tribe has accepted. Since this will be paid from the U.S. Treasury it will have no impact on BPA revenues. The delivery of power from the local agency serving the region has been accommodated by the construction of adequate transmission facilities in the vicinity of the molybdenum mine. No action has been taken on the part of the Tribes to pursue their claims in over 2 years.

LABOR RELATIONS LITIGATION

Columbia Power Trades Council (Union) v. United States Department of Energy, Bonneville Power Administration and Sterling Munro, as Administrator, U.S. District Court, Western District of Washington, No. 79-11352, filed October 3, 1979

The Union represents several unions whose members are hourly employees of BPA. Each year BPA and the Union negotiate a collective agreement covering work practices, pay, and other matters. But for the President's limitation of a wage increase to all Federal employees to 5.5 percent, BPA's hourly employees would have been entitled to an increase of 8.53 percent. The Union elected to submit entitlement to the 8.53-percent increase to nonbinding arbitration. The arbitrators' award allowed the requested increase but the BPA Administrator could not accept the award on the ground that he was bound by the President's limitation. This was an action to recover the difference between the 5.5 percent allowed and the 8.53 percent granted by the arbitration award for the period from March 4, 1979, to September 30, 1979. On August 22, 1980, a decision was issued sustaining the Government's position. A notice of appeal to the Ninth Circuit Court of Appeals was filed on September 10, 1980, and the appeal will be argued early in April. If the plaintiff succeeds on its appeal, the liability of BPA for the 3.03-percent difference would be about $546,000.

CONTRACT CLAIMS

Erickson Air-Crane of Washington, contractor for construction of Schedule I of the Slatt-Marion Lines 500-kV 1 and 2, has filed a claim in the amount of approximately $2.4 million for alleged extra costs due to the delays and for other reasons.

R. C. Hughes Corp. has filed a claim on its contract for construction of Schedule III of the same line in the amount of $1.3 million.

If BPA is determined to be liable on any of these claims, the amount is anticipated to be substantially less than the claims and if any part is allowed, it will be capitalized as a cost of constructing the line.

TORT CLAIMS

Calvin Simsen. Claims of $1.75 million for himself and of a like amount for his wife due to a rear-end vehicle accident were filed in the U.S. District Court for Oregon. Settlement has been reached for both claims in the amount of $900,000, which has been forwarded to the Department of Energy for approval. Payment would be made from the Department of Justice judgment fund.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATION

SOUTHEASTERN POWER ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Operation and Maintenance, Southeastern Power Administration

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy pursuant to the provisions of Section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southeastern power area, $20,594,000, to remain available until expended.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

SOUTHEASTERN POWER ADMINISTRATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL.			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1			
	1	1	1
SUBTOTAL.	1	1	1
GS-18			
GS-17			
GS-16			
GS/GM-15	5	5	5
GS/GM-14			
GS/GM-13	4	4	4
GS-12	4	4	4
GS-11	3	3	3
GS-10			
GS-9	2	2	4
GS-8	1	1	1
GS-7	4	4	4
GS-6	6	6	6
GS-5	3	3	3
GS-4	1	1	1
GS-3	1	1	1
GS-2	1	1	1
GS-1			
SUBTOTAL.	35	35	37
UNGRADED	2	2	2
TOTAL PERMANENT POSITIONS	38	38	40
UNFILLED POSITIONS, END OF YEAR . . .			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	38	38	40

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
SOUTHEASTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(in thousands of dollars)

	FY 1983	FY 1984
Appropriation	$ 3,964	$20,594
Subtotal, Budget Authority	$ 3,964	$20,594
Receipts and Disbursements:		
Unobligated Balance, Start of Year	$ 3,398	--
Unobligated Balance, End of Year	--	--
Offsetting Collections from Non-Federal Sources	3,737	3,153
Total, Obligations	$11,099	$23,747

FY 1984 Congressional Budget
PROGRAM OVERVIEW

Southeastern Power Administration
Operation and Maintenance

Southeastern markets Federal hydroelectric power produced at Corps of Engineers' constructed projects in the 10 Southeastern States. The overall goal of the SEPA program is to provide for the transmission and disposition of Federal hydroelectric power in the Southeast in a sound, fair, and orderly manner. The power produced by 76 generating units located at 21 hydroelectric projects throughout the Southeast makes an important contribution to the peaking power requirements of the area. A large number of area utility systems depend upon SEPA power to carry load, provide reserves, and help meet emergency conditions. The program is structured to:

Encourage widespread use of available Federal Power.

Make the power available at the lowest possible rates to consumers consistent with sound business principles.

Formulate power rates to recover all cost of producing and transmitting power including amortization of capital investment allocated to power over a 50-year period.

Give preference in the sale of power to public bodies and cooperatives.

Utilize existing area transmission facilities to accomplish transmission of power to customer load centers.

Integrate projects to the maximum feasible extent and operate projects to provide maximum power contribution in meeting area power requirements.

Encourage development of additional hydroelectric power projects that are economically and environmentally feasible.

SEPA is unique among the power marketing administrations in that it owns no transmission facilities and accomplishes the delivery of power to customer premises over the transmission facilities of area utilities. Further, the power available for sale is generally a limited quantity of peaking power which requires specialized contracts with preference customers and wheeling utilities under which SEPA supplies a portion of the power requirements of the customer with the customer obtaining its remaining partial requirements from other sources. SEPA does not supply the entire power requirement of any customer.

With additional generation coming on line and under new written marketing policy now evolving, other preference customers will be offered the opportunity to purchase power from SEPA. All of SEPA's costs are considered as operating expenses in the power marketing program and, as such, are repaid to the Treasury from collected SEPA power revenues.

SEPA provides a regional overview of the power marketing program in the Southeast, and from this viewpoint provides for widespread use of developed power.

The power marketing program results in the conservation of nonrenewable energy sources by utilizing the renewable resource of falling water to its greatest advantage for electric power generation. This program contributes to the overall power supply of the region.

Program accomplishments during FY 1982 and expectations for FY 1983 include:

Power is currently marketed to 195 wholesale customers in 11 states from 21 operating projects which have a combined capacity of 2,712,375 kilowatts.

Revenues earned in FY 1982 totaled $60,913,100 and are estimated at $64,300,000 in FY 1983, and at $84,200,000 in FY 1984.

Negotiations have been completed and contracts executed with Duke Power Company and existing preference customers in the Duke Service area implementing near term goals of the Georgia-Alabama System marketing policy.

Supplemental contracts were negotiated and current rates established with Virginia Electric and Power Company, Carolina Power & Light Company, preference customers in said customers' areas, and preference customers in the Florida Power Corporation area as scheduled.

Development of an interim marketing policy applicable to the Kerr-Philpott System and a final marketing policy applicable to the Cumberland System are scheduled for completion during FY 1983.

Financial feasibility studies for several proposed hydroelectric projects were prepared.

Specific objectives for FY 1984, designed to meet the requirements of Section 5 of the Flood Control Act of 1944, are:

Administer 250 to 300 contracts with more than 250 customers in a fair and effective manner that carries out the intent of contract provisions.

Complete the formulation of any remaining and planned written power policy for application to future power available from existing projects and from the Richard B. Russell Dam and Reservoir now under construction.

Negotiate and execute appropriate and timely contract arrangements for power marketed pursuant to written power policy, to existing and additional customers.

Formulate and obtain confirmation and approval of updated wholesale power rates for each of SEPA's systems of projects.

Seek favorable resolution of lawsuits brought against the Department and SEPA.

Market, on a long-term basis, power made available from an additional unit at the Hartwell Project and the Richard B. Russell Project, now under construction. The Richard B. Russell Project will add 300,000 kilowatts of conventional power which is scheduled to begin operation in 1984, and 300,000 kilowatts of pumped storage power which is scheduled to begin operation in 1987. The additional Hartwell unit will add 80,000 kilowatts.

Accomplishment of these objectives will help meet the objectives of pertinent public laws; make an important contribution to the peaking power requirements of the area; contribute significantly to the reliability of a large number of area systems; and provide a significant contribution to the maintenance of the pluralistic power industry and to the area's economic well-being.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Power Marketing - Southeastern Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Operation and maintenance				
Operating expenses	$1,315	$ 1,500	$ 1,570	$ 1,751
Purchase power and wheeling	5,922	2,464	2,394	18,843
Total, Operation and Maintenance	$7,237	$ 3,964	$ 3,964	$20,594
Staffing				
FTP/Total FTE's	37/38	38/39	38/39	40/41

Authorization: Section 5, Flood Control Act of 1944 (16 U.S.C. 825s)

Summary of Change

FY 1983 Appropriation	$ 3,964
Built-in increases and decreases:	
Operation and maintenance	
- Pay costs and terminal leave payments	+ 70
Purchase power and wheeling	
- To absorb additional personnel costs	- 70
FY 1984 Base	$ 3,964
Program increases and decreases:	
Operation and maintenance	
- Statutory personnel increases	+ 13
- Increase FTE by two positions	+ 50
- Additional ADP equipment and associated costs	+ 65
- Equipment replacements	+ 27
- Other nominal increases	+ 26
Purchase power and wheeling	+16,449
FY 1984 Budget Request	$20,594

NARRATIVE JUSTIFICATION

This budget request provides for (1) scheduling the generation of power and supervision of power deliveries; (2) purchase of firming energy to meet customer load requirements and payment of wheeling charges for delivery of power over non-Federal transmission lines; (3) administration of contracts for the sale of power and energy and establishment of rates to assure repayment of power costs; and (4) general administration and support of Southeastern's power marketing program.

The budget proposal will provide for the continuation of the basic power marketing program with implementation of announced power marketing policies without new program initiatives.

During the past several years, preference agencies' interest in purchasing power from Southeastern has increased substantially. The desire to purchase Federal power by these agencies is motivated by many factors, including the recent large cost increases from alternative sources of supply. The requests for additional power by agencies throughout the area are coming at a time when only one new project, the Richard B. Russell Dam and Reservoir, is scheduled to begin operation. The Richard B. Russell Project and the installation of a fifth generating unit at the Hartwell Project are the only Federal power resources scheduled by the Corps of Engineers to be added during the next 10-year period.

As a result of the many requests for power from potential customers, SEPA is continuing to take several actions. First, a determination was made not to allow existing contracts to automatically renew for additional terms until a review of power marketing policy could be made, and notice to that effect was given to several utilities.

As a second step, SEPA adopted a public participation procedure which it is following in the development of future written power marketing policies. This procedure allows interested parties to present and SEPA to obtain desired public comments in an orderly, timely, and adequate manner.

Southeastern does not own or operate any transmission facilities and carries out its marketing program by utilizing the existing transmission systems of the power utilities in the area. This is accomplished through "wheeling" arrangements between Southeastern and each of the area utilities with transmission lines connected to the projects. The utility agrees to deliver specified amounts of Southeastern power to Southeastern customers, and Southeastern agrees to compensate the utility for the wheeling service performed.

While the law specifies that Southeastern give preference in the sale of its power to public bodies and cooperatives, Southeastern has not been able to market all elements of its power to preference customers in the past. Power not sold to the preference customers was sold to the utilities who perform the wheeling service for Southeastern. A "net-billing" process was instituted which provided that the amounts owed the utilities by Southeastern for wheeling were offset by the amounts owed Southeastern by the utilities for purchased power with the remainder being paid by the owing party. Under this arrangement Southeastern needed appropriations to cover only those amounts where Southeastern would be the owing party after net-billing.

Now, however, due to preference customer load growth and to a shift in the power rate structures in the area, preference customers are able to fit substantially all Southeastern's peaking power in their load curves and utilize the power both physically and economically. For these reasons, Southeastern's new written power marketing policy for its Georgia-Alabama System and its proposed policies for the Kerr-Philpott System and the Cumberland System anticipate that in the future all power will be sold to preference customers with no sales to the private utilities who now provide the transmission services. Under these conditions there will be no money owed to Southeastern by the private utilities to "net-bill" against and Southeastern will need to actually pay the companies the total wheeling charge each month. Because of changes in sales arrangements, the FY 1982 and FY 1983 budget requests included an increase in appropriations. As new sales arrangements are negotiated for the respective utility areas, requests for appropriated funds will need to be further augmented in FY 1984, progressively increasing each year for several years into the future under the current policy. While increases in appropriated funds for wheeling will be offset by similar increases in power receipts deposited in the Treasury by Southeastern, efforts are underway to devise means of reducing these budgetary requirements.

Operation and Maintenance..$1,751,000

The activity provides for the operation and maintenance of the headquarters office of the Southeastern Power Administration which markets power produced at Corps of Engineers' projects.

Both an additional unit at the Hartwell Project and the first unit at the Richard B. Russell Dam and Reservoir are scheduled to begin operation during 1984. SEPA must complete negotiations with existing and new preference customers to arrange for marketing these new resources. SEPA is also analyzing the financial feasibility of potential hydroelectric resources within the ten Southeastern states area.

During FY 1984, Southeastern will maintain power billing, collection, and payment functions for 265 customers served under 269 contracts and will prepare financial and marketing analyses with respect to existing and potential projects. Southeastern will also coordinate power operations of 22 operating projects with 4 Corps of Engineers districts and 21 scheduling utilities. Determinations of capacity and energy availability are made weekly in arriving at quantities available to meet contractual commitments from the various projects. A continuing review of actual project operations is performed to assure that computer models correspond to actual operating conditions and to assure that maximum production is obtained from the water available.

SEPA, within the provisions of its contracts, is maintaining contacts with the various utilities that it serves to provide delivery of peaking power in advance of entitlement to the extent possible to keep oil-fired generation from being put on line to serve peaking loads or for generation during emergency outages of other equipment. The additional deliveries are accomplished with full cooperation of the Corps of Engineers.

Power policy formulation issues, centering on future allocations of power, have caused SEPA to re-examine the informal policy that has previously been followed in power marketing. Issues under scrutiny include marketing areas, allocations of power, handling of pumped-storage energy, utilization of area utility systems, resale rates, and conservation measures. Written policies for SEPA's respective systems will systematically replace previous ad hoc approaches to power marketing. In its policy implementation, SEPA will devise innovative marketing arrangements as necessary to meet changing conditions.

Southeastern has issued its final power marketing policy for its Georgia-Alabama System of Projects and has negotiated and executed contracts with Duke Power Company and existing preference customers in the Duke service area implementing near term goals of the policy. This policy anticipates the ability to market all available capacity and energy to preference customers.

The policy for the Georgia-Alabama System also anticipates that existing preference customers will be entitled to continue to purchase existing allocations of power in the system with potential new preference customers sharing in the purchase of additional power made available from the Hartwell and Richard B. Russell Projects.

SEPA has published its proposed power marketing policy for the Cumberland Basin System and written comments are now being evaluated and other actions are being taken prior to proceeding with final policy development. SEPA has published an interim power marketing policy for the Kerr-Philpott System and has published a revised proposed long-term policy for that system inviting further public input. The proposed policies for these systems also anticipate the ability to market all available capacity and energy to preference customers.

Departmental policy specifies that the financial statements and accompanying notes to the financial statements of each power system of the Southeastern Federal Power Program shall be examined periodically, with the period not to exceed two years, by independent auditors. The results of the examination shall be reported in a letter which describes the scope of the examination and expresses an opinion on the financial statements. Power repayment studies prepared for rate adjustments must utilize much of the data contained in the financial statements and this action is necessary to assure that SEPA can adjust power rates as required to keep repayment on a current basis. Previously the financial statements have been audited biennially; however, beginning in FY 1984, Southeastern plans annual audits of the financial statements to provide a more businesslike operation.

The major portion of the request for this activity provides funding for personnel compensation and related costs of $1,354,000. Two additional personnel are required due to the increased workload associated with the day-to-day scheduling of projects resulting from a more direct role in the operation and marketing of power from the Cumberland System anticipated in the marketing policy for that system; due to increased activity in the analysis of potential hydroelectric resources in the Southeastern area; and to maintain a reliable degree of capability in performing project operation studies.

Funds are also requested for equipment additions and replacements including the purchase of additional ADP equipment, software, and associated costs to enhance existing computer support and to improve billing operations, provide more reliable and timely financial data, and to perform complex technical hydrological and project operations studies. Funding is also required to replace office equipment which has been in service for long periods of time, and to provide for nominal increases resulting from higher administrative costs for support functions (travel, transportation of things, GSA rental, communications, printing and reproduction, and supplies and materials).

Purchase Power and Wheeling..$18,843,000

Funds provided for this activity are used only to pay amounts charged the Government under contractual arrangements for (1) delivery of power over non-Federal systems to load centers of preferred customers for the account of the Government, and (2) purchase by the Government of energy to firm-up Federally-generated power to the load factor required by preferred customers, to provide support capacity required to meet commitments for the Jim Woodruff Project under adverse water conditions, and to defray other costs under drought conditions.

SEPA has been deeply involved in the development of new written power marketing policies which allow all available SEPA power within those systems to be marketed to preference customers in the future. These new policies will be implemented as new long-term contracts are executed for future power sales. New contracts which are planned to provide for the sale of all power to both existing and new preference customers during all or a portion of FY 1984 would cover the following SEPA sales:

1. That portion of the power produced in the Cumberland River System which is proposed to be wheeled outside the TVA service area.

2. All power produced in the Kerr-Philpott System and now marketed in the Virginia Electric and Power Company and Carolina Power & Light Company service areas.

3. That portion of the power produced in the Georgia-Alabama System of Projects and sold in the Southern Company service area (Georgia, Alabama, Mississippi, and Florida).

In the past Southeastern has offset the amounts owed the utilities for wheeling by the amounts that the utilities owed Southeastern for purchased power. Under this arrangement Southeastern needed appropriations to cover only those amounts where Southeastern would be the owing party after net billing. Under the new arrangements, the process of net billing will be eliminated because the utilities will no longer owe Southeastern for power purchases. Southeastern will need to actually pay the wheeling utilities for the total wheeling charges based on cost of service studies and on total power available for sale from the projects each month. The increase is required to pay these wheeling charges as well as anticipated increases in existing charges while efforts are underway to devise means of reducing these budgetary requirements. While it should be noted that the increase in funding for wheeling will be offset by similar increases in power receipts deposited in the Treasury by Southeastern, efforts are underway to devise means of reducing these budgetary requirements.

Additionally, purchase power and wheeling funds are required under the operation of existing contracts for the sale of power produced at the Jim Woodruff Project and now sold in the Florida Power Cooperation service area.

All of SEPA's costs are considered as operating expenses in the power marketing program and, as such, are repaid to the Treasury from collected SEPA power revenues.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Operation and Maintenance

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Coordination of reservoir operation	Daily coordination of operation of 21 projects with 4 Corps of Engineers Districts and 20 scheduling utilities	Daily coordination of operation of 22 projects with 4 Corps of Engineers Districts and 22 scheduling utilities
Power billing, collection, and payment function	Monthly billing under 240 contracts	Monthly billing under 269 contracts
Customers serviced	235	265
Contract negotiation	Negotiate appropriate contractual arrangements to implement power marketing policy decisions (200 contracts)	Negotiate appropriate contractual arrangements to implement power marketing policy decisions (250 contracts)
Operations Studies	10	12
Project Feasibility	7	13
Estimated power revenues	$64,300,000	$84,200,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS

SOUTHEASTERN POWER ADMINISTRATION

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Estimate
Generating capacity:			
Installed capacity (kw)	2,712,375	2,792,375 a/	2,867,375 a/
Peak capacity (kw)	3,048,330	3,080,000	3,150,000
Generating stations:			
Generating projects (No.)	21	21	22
Available energy:			
Energy generated (mwh)	6,409,124	7,000,000	7,050,000
Energy purchased (mwh)	147,612 b/	100,000	50,000
Adjustment of Energy Account (mwh)	492,073 c/	-200,000	-200,000
Energy available for Marketing (mwh)	7,048,809 d/	6,900,000	6,900,000

a/ Hartwell Project 5th unit, 80,000 kw, scheduled August 1983, and Richard B. Russell 1st unit scheduled for July 1984.

b/ Included purchases of minimum energy of 51,424 mwh.

c/ Due to drought conditions, energy was drawn out of energy accounts maintained with wheeling utilities.

d/ Included transmission losses of 187,224 mwh. Energy marketed amounted to 6,861,585 mwh.

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

Southeastern Power Administration

Project	State	Plants	Installed Capacity (KW)	FY 1982 Actual Power (GWH)	FY 1983 Estimated Power (GWH)	FY 1984 Estimated Power (GWH)
Power Marketed						
John H. Kerr	Va.	1	204,000			
Philpott	Va.	1	14,000	474*	450*	430*
Allatoona	Ga.	1	74,000			
Buford	Ga.	1	86,000			
Carters	Ga.	1	500,000			
Clarks Hill	Ga.-S.C.	1	280,000			
Walter F. George	Ga.-Ala.	1	130,000	2,754*	2,860*	2,880*
Hartwell	Ga.-S.C.	1	344,000a/			
Jones Bluff	Ala.	1	68,000			
Millers Ferry	Ala.	1	75,000			
West Point	Ga.-Ala.	1	73,375			
Richard B. Russell	Ga.-Ala.	1	75,000b/			
Jim Woodruff	Fla.	1	30,000	236	240	240
Barkley	Ky.	1	130,000			
Center Hill	Tenn.	1	135,000			
Cheatham	Tenn.	1	36,000			
Cordell Hull	Tenn.	1	100,000	3,346*	3,053*	3,053*
Dale Hollow	Tenn.	1	54,000			
Old Hickory	Tenn.	1	100,000			
J. Percy Priest	Tenn.	1	28,000			
Wolf Creek	Ky.	1	270,000			
Laurel	Ky.	1	61,000	52	67	67
Total, power marketed		22	2,867,375	6,862	6,670	6,670

*Projects are integrated hydraulically, electrically, and financially for marketing purposes.

a/ Includes Hartwell 5th unit of 80,000 kw scheduled August 1983.

b/ Richard B. Russell 1st unit of 75,000 kw is scheduled for July 1984.
NOTE: New contracts are being negotiated in the Kerr-Philpott area which eliminates the purchase of deficiency energy.

FY 1984 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION
Southeastern Power Administration

Greenwood (Miss.) Utilities Commission v. Edwards and Wright, U.S. District Court for Middle District of Georgia, No. 77-179-MAC; originally filed April 20, 1977, with Andrus and Fortune as Defendants in U.S.D.C., D.C., No. 77-0689; transferred by Order dated September 9, 1977.

Plaintiff, located outside the geographically selected marketing area for Federal power, filed Complaint alleging that Defendants violated Section 5 of the Flood Control Act of 1944, 16 U.S.C. 825s, or otherwise acted unlawfully in (1) denying Plaintiff an allocation of power because of its geographic location, (2) selling power to nonpreference customers while denying power to Greenwood, a preference customer, (3) discriminating against Greenwood, while providing service to other preference customers, (4) failing to prepare EIS as required by Section 102 of NEPA, 42 U.S.C. 4332, (5) following unjust and unreasonable allocation procedures, (6) failing to hold a hearing and develop an adequate record upon which valid allocations could be made, (7) failing to develop and promulgate, with interested party input, regulations or procedures governing availability, application for, and allocation of power.

Plaintiff tried unsuccessfully to add as parties the Southern Company and four of its subsidiaries, entities with whom SEPA has marketing arrangements, and add an antitrust count to the Complaint. Subsequently, Defendants by motion for partial summary judgement eliminated several of the issues. Discovery has been completed and the case may be tried in 1983.

Southeastern Power Administration v. Kentucky Utilities Company, before the Federal Energy Regulatory Commission, Docket No. EL80-7.

SEPA initiated this action seeking a FERC order requiring Kentucky Utilities Company to wheel 25 megawatts of Cumberland River Basin power to eight Kentucky municipalities. The Application, brought pursuant to Sections 211 and 212 of the Federal Power Act, 16 U.S.C. 824j and k, was filed December 11, 1979, following five years of unsuccessful negotiations. An Administrative Law Judge denied SEPA's request following an 18-day hearing. Since December 1981, the matter has been before the full Commission on Exceptions to the ALJ's Decision.

ElectriCities of North Carolina, et al. v. Southeastern Power Administration, et al., U.S. District Court for the Eastern District of N.C., No. 82-888-Civ. 5, filed July 29, 1982.

The Complaint of ElectriCities, brought on behalf of 60 of its member North Carolina and Virginia municipals and two South Carolina cities, attacks SEPA's final Georgia-Alabama System Marketing Policy and the interim and revised proposed long-term policy for SEPA's Kerr-Philpott System as not being in accord with the statutory criteria set forth in Section 5 of the Flood Control Act of 1944. Specifically, the marketing areas proposed, methods of allocations, and SEPA's four system marketing approach are attacked in favor of a single system approach for the entire 10-state southeastern area of the United States. The Government, supported by many SEPA customers who have petitioned to intervene, filed a Motion to Dismiss on November 2, 1982, along with a Motion for Oral Argument. Plaintiffs' reply was filed on December 13, 1982, and the Government and Intervenor Defendants responses are due January 14, 1983. Depending on the Court's disposition of the Motion to Dismiss, further motions, including one to change the venue to the District Court wherein SEPA's headquarters is located may be filed.

Power Marketing
Southeastern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1983 Estimated Budget Authority	FY 1984 Requested Budget Authority
Continuing Fund		
Emergency Expenses	...	...
Total, Continuing Fund	...	...

Authorization: 16 U.S.C. 825s-2

Continuing Fund	...	...

The Southeastern Power Administration Continuing Fund of $50,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southeastern area, is available to defray emergency expenses necessary to insure continuity of service.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

SOUTHWESTERN POWER ADMINISTRATION

VOLUME 5

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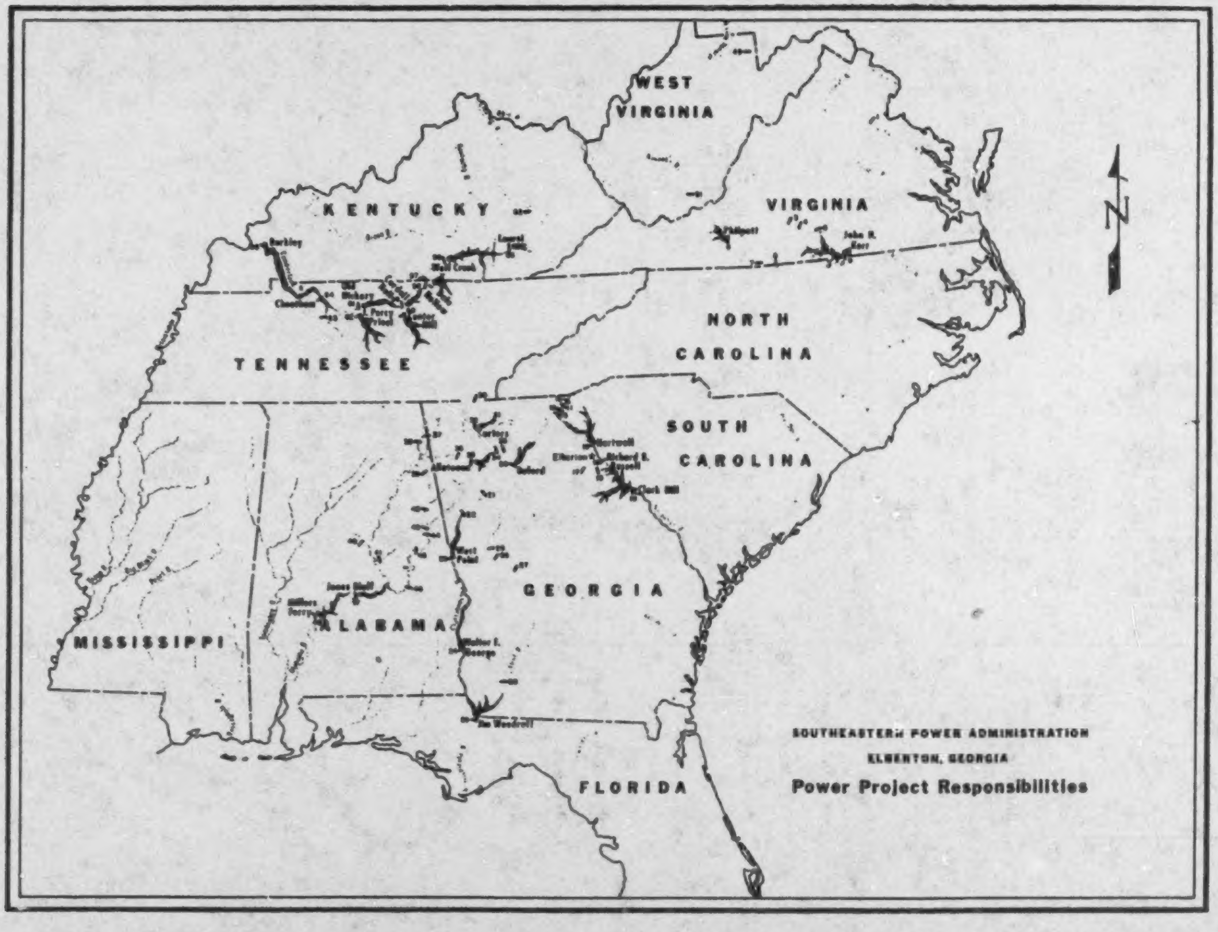

WEST VIRGINIA
KENTUCKY
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
FLORIDA
N
Barkley
Cheatham
Old Hickory
Percy Priest
Center Hill
Wolf Creek
Laurel
Philpott
John H. Kerr
Carters
Allatoona
Buford
Hartwell
Richard B. Russell
Clark Hill
West Point
Jones Bluff
Millers Ferry
Walter F. George
Jim Woodruff

SOUTHEASTERN POWER ADMINISTRATION
ELBERTON, GEORGIA
Power Project Responsibilities

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Operation and Maintenance, Southwestern Power Administration

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy, and for construction and acquisition of transmission lines, substations and appurtenant facilities, and for administrative expenses connected therewith, in carrying out the provisions of section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southwestern power area, $36,229,000, to remain available until expended.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

SOUTHWESTERN POWER ADMINISTRATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1	2	2	2
SUBTOTAL	2	2	2
GS-18			
GS-17			
GS/GM-15	3	3	3
GS/GM-14	13	13	13
GS/GM-13	15	16	16
GS-12	12	13	13
GS-11	21	22	23
GS-10	1	2	2
GS-9	3	2	3
GS-8	5	5	5
GS-7	7	8	8
GS-6	9	9	9
GS-5	9	12	12
GS-4	3	3	3
GS-3		1	1
GS-2			
GS-1			
SUBTOTAL	101	109	111
UNGRADED	55	55	55
TOTAL PERMANENT POSITIONS	158	166	168
UNFILLED POSITIONS, END OF YEAR			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	158	166	168

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Southwestern Power Administration
(in thousands of dollars)

	FY 1983	FY 1984
Appropriation	$20,756	$36,229
Unobligated Balances, Start of Year	17,622	--
Unobligated Balances, End of Year	--	--
Total Available for Obligation	$38,378	$36,229

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Southwestern Power Administration - Operation and Maintenance

This program is conducted in support of the following mission area:

- Southwestern Power Administration carries out the responsibilities assigned to the Secretary of Energy pursuant to Section 5 of the Flood Control Act of 1944 and Section 302 of the Department of Energy Organization Act. These Acts authorize the distribution and sale of power and energy produced from 22 hydroelectric projects at the lowest possible rates, consistent with sound business principles, to cooperatives, municipalities, Government installations and private companies in the states of Arkansas, Missouri, Oklahoma, Texas, Kansas and Louisiana.

FY 1983 accomplishments include:

- Markets power and energy in an average year equivalent to 7.2 million barrels of oil.
- Approval by FERC of rate application filed April 1979.
- Disposed of 29 miles of 69 kV transmission line and two sub- and switching stations.
- Signed new contractual arrangement with Associated Electric Cooperative, Inc.

Specific objectives for 1984 to 1988, formulated in response to Public Laws, are:

- Market hydroelectric power and energy to preference customers.
- Recover costs of operation by establishing effective rates.
- Dispatch and control the flow of power over the transmission system.
- Maintenance of transmission lines, substations, switching stations, radio stations and microwave stations.
- Purchase and wheel power and energy to maintain contractual relationships.
- Bring new hydro project into the integrated system.

Accomplishment of these specific objectives will help meet the objectives of pertinent Public Laws; utilize natural resources and provide an additional energy source to meet the nation's needs.

Department of Energy
FY 1984 Congressional Budget Request
Lead Table
Power Marketing
Southwestern Power Administration - Operating Expenses
Southwestern Power Administration - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Power Marketing-Southwestern Power Administration				
Operation and Maintenance	$8,521	$9,070	$10,085	$9,800
Purchase power and wheeling	9,210	7,156	7,156	22,729
Construction	3,538	4,530	4,530	3,700
Total, power marketing	$21,269	$20,756	$21,771	$36,229
Staffing FTP/Total FTE's	157/189	166/190	168/192	168/192

Authorization: 94 Stat. 1331 FY 1982 Appropriation Act. P.L. 97-88

Summary of Changes

FY 1983 Appropriation	$20,756
Operation and Maintenance	
- Annual Wage Board increases	+143
- GSA standard level user charge	+ 39
- Service contract	+181
- Communication	+142
- Overtime	+104
- Supplies and Materials	+ 47
- Travel and transportation of persons	+ 74
- COLA pay raises	+160
- Medicare	+ 65
FY 84 Base	$21,771
Program increases and decreases:	
Operation and Maintenance	
- COLA pay raises (not allowed)	-160
- Medicare (not allowed)	- 65
Purchase power and wheeling	
- Anticipated thermal energy purchases and wheeling for 3 & ½ months of critical year	+15,573
Construction	
- Electronic equipment replacements	-830
FY 1984 budget request	$36,229

Narrative

Southwestern Power Administration carries out the responsibilities assigned to the Secretary of Energy pursuant to Section 5 of the Flood Control Act of 1944 and Section 302 of the Department of Energy Organization Act. These Acts authorize the distribution and sale of power and energy produced from 22 hydroelectric projects at the lowest possible rates, consistent with sound business principles, to cooperatives, municipalities, Government installations and private companies in the States of Arkansas, Missouri, Oklahoma, Texas, Kansas, and Louisiana.

Southwestern Power Administration	$36,229,000
System Operation and Maintenance Activity	$ 9,800,000

The activity employs 192 people and consists of functions performed in our day-to-day operation of the SWPA power system in marketing power and energy in a six-state area. During FY 1984 SWPA will schedule and dispatch power from 22 Federal hydroelectric plants with a total installed capacity of 2,089,800 kilowatts, utilizing 1,660 miles of high voltage transmission system and 30 switching and substations.

Maintenance functions are performed on 1,660 miles of high voltage transmission lines, 30 sub- and switching, 20 radio and microwave stations, and supervisory control and communication equipment for control of the entire SWPA system and integrated projects, including 22 Corps of Engineers' hydroelectric projects.

The maintenance is steadily increasing to accommodate the complexity of the electrical system, the increased maintenance requirements associated with an aging system, and to allow energy load carrying growth requirements to accommodate system interconnections with customers and area utilities. This activity, in addition, performs preventive and remedial maintenance on the components of the power system with efforts largely concentrated on replacement of deteriorated transmission poles and crossarms, uprating and replacement of undersized equipment, and servicing transformers, oil circuit breakers, relaying, metering and communication systems.

Brush control efforts are performed by each area's maintenance workforce in addition to transmission line, substation and control system maintenance. Each area maintains a brush control program on Southwestern's transmission rights-of-way, in order to preclude system power outages due to trees reaching energized lines, with each line being recleared on a three-year cycle. The maintenance of the transmission line rights-of-way also includes fence gates, access roads, and the protection and preservation of the environment in accordance with the National Environmental Policy Act (P.L. 91-190).

The Division of Power Marketing, through the Branch of Rates and Repayment, organizes, plans and directs the financial soundness aspect of power sales, maintains marketing statistics and prepares rate and repayment studies. Another Division component, the Branch of Customer Service, is responsible for the negotiations and administration of contracts for the sale, purchase and interchange of power and energy with cooperatives, municipalities, Government agencies and private utility companies. Contact is maintained with SWPA customers to promote coordinated power planning for best utilization of hydro peaking power and to enhance reliability of service. Comparisons are made of customer load growth to resources available for sale. Revenue estimates are compared with the financial repayment requirements of Federal investment in transmission and hydrogeneration plants. Marketing reports are maintained on each customer and each classification of electric service for analysis by management.

The number of power contracts under negotiation is increasing significantly as firm power contracts and high load factor peaking power sales arrangements are developed in order to market capacity in a manner which will optimize net revenues. Moreover, with the advent of public allocation hearings and SWPA responsibilities in keeping with the Flood Control Act of 1944 to seek the most widespread use of Federally generated power, it is expected the number of power contracts for negotiation will increase even more significantly.

The Branch of Power Resources and Production makes economic analyses on the operation of hydro reservoirs and market conditions. Power capability studies will be undertaken based on existing and future hydroelectric projects along with load studies, and feasibility studies affecting the transmission system. The evaluation of program alternatives and regional power system interconnection studies enter into such planning.

The Branch of Data Processing activities include software for budget and accounting reports. Studies are run on hydraulic, engineering, power planning, and repayment. Continuing appraisals are also run to determine the financial feasibility of including generation facilities in multi-purpose projects planned or under construction.

The Branch of Procurement and Property Management activities includes procurement, reproduction, land acquisition, office services and real and personal property management.

The Offices of the Administrator, Public Affairs, Human Resource Development, Chief Counsel, Personnel and Division of Administrative Management provide management and direction to the progress of Southwestern Power Administration.

Purchase of Power and Wheeling Activity $22,729,000

The request consists of:

A. Contract Commitments	
Oklahoma Companies Wheeling	$ 3,065,600
Energy	7,909,000
Western Area Power Administration	74,000
Subtotal	$11,048,600
B. Thermal Support for Hydro System	
Western Area Power Administration	$ 300,000
Other Utility Systems	11,380,400
Subtotal	$11,680,400

Obligations to be incurred during FY 1984 for this activity are projected upon three and one-half months of critical year water conditions. These provide amounts of thermal energy required to supplement hydroenergy in order to meet specific contractual commitments and to pay transmission wheeling expenses for moving power to Government customers not directly connected to the SWPA transmission system. In addition, quantities of thermal energy must be purchased to supplement hydro generation during low water years. If in any month the cost of energy purchased by SWPA from a particular customer, plus any transmission service charges due that customer, exceeds the revenue received from that customer, an obligation from this activity is incurred against appropriated budget authority.

Southwestern has also taken action to convert expiring contracts from high energy commitments to lower energy commitments, thus reducing purchase power and wheeling budget levels. The effects of this action will be noticeable on Southwestern's budget requirements in FY 1985, and become more significant in subsequent years. By FY 1987, Southwestern's projected needs will be reduced some $15,800,000 annually, or nearly 30 percent under projections at existing levels of purchases. Without these reduced purchase power and wheeling levels the purchase power and wheeling estimate for FY 1987 would be $35,100,000, rather than the projected $19,300,000 shown on our out-year projections. This reduction occurs in the face of increasing unit fuel costs. Efforts continue to derive new ways of reducing budget requirements.

Construction .... $ 3,700,000

The activity provides transmission, substation, and switching facilities to transmit power generated at Corps of Engineers' hydroelectric projects in the southwest.

Much of the equipment installed in the transmission system has been in operation for a number of years and load growth has caused obsolescence. In many instances there is insufficient line capacity, in line size, that cannot be utilized because of old undersized switches or other items of equipment. Operating studies have shown Southwestern circuits becoming overloaded and in some cases limiting the transfer capability of power from the Southwest Power Pool to other regions of the nation. This activity's budget request is designed to avoid any postponement of current system restraints that could result in voltage and power reductions to many municipal customers.

Capital equipment not related to construction includes purchase of wood poles, crossarms, and hardware used in our transmission line replacement programs. Current trends indicate that the number of poles deteriorating within the system is increasing yearly. This activity includes funds to respond to system requirements and avoid any postponement of work that could create conditions requiring more costly accelerated placement programs. Postponement of required work reduces the power system reliability by increasing the probability of power outages resulting from transmission line failure due to broken poles.

Similar situations exist for substation equipment, electronic equipment and test equipment replacement. This work is performed on an "as-needed" basis and failure to perform the required replacement not only results in the necessity to achieve it at a later date, but also increases the probability of imminent equipment failure and power outages. Vehicle replacements are based on DOE guidelines in conjunction with effective cost/benefit considerations. Delaying replacement could result in more frequent breakdowns and repairs which in turn dramtically affect the man-hour lost time costs. This cost is more significant when large specialized equipment breakdowns occur causing a loss in production for our seven-man work crews.

This activity utilizes personnel budgeted in the Operation and Maintenance Activity on a force account basis.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Key Activity Summary

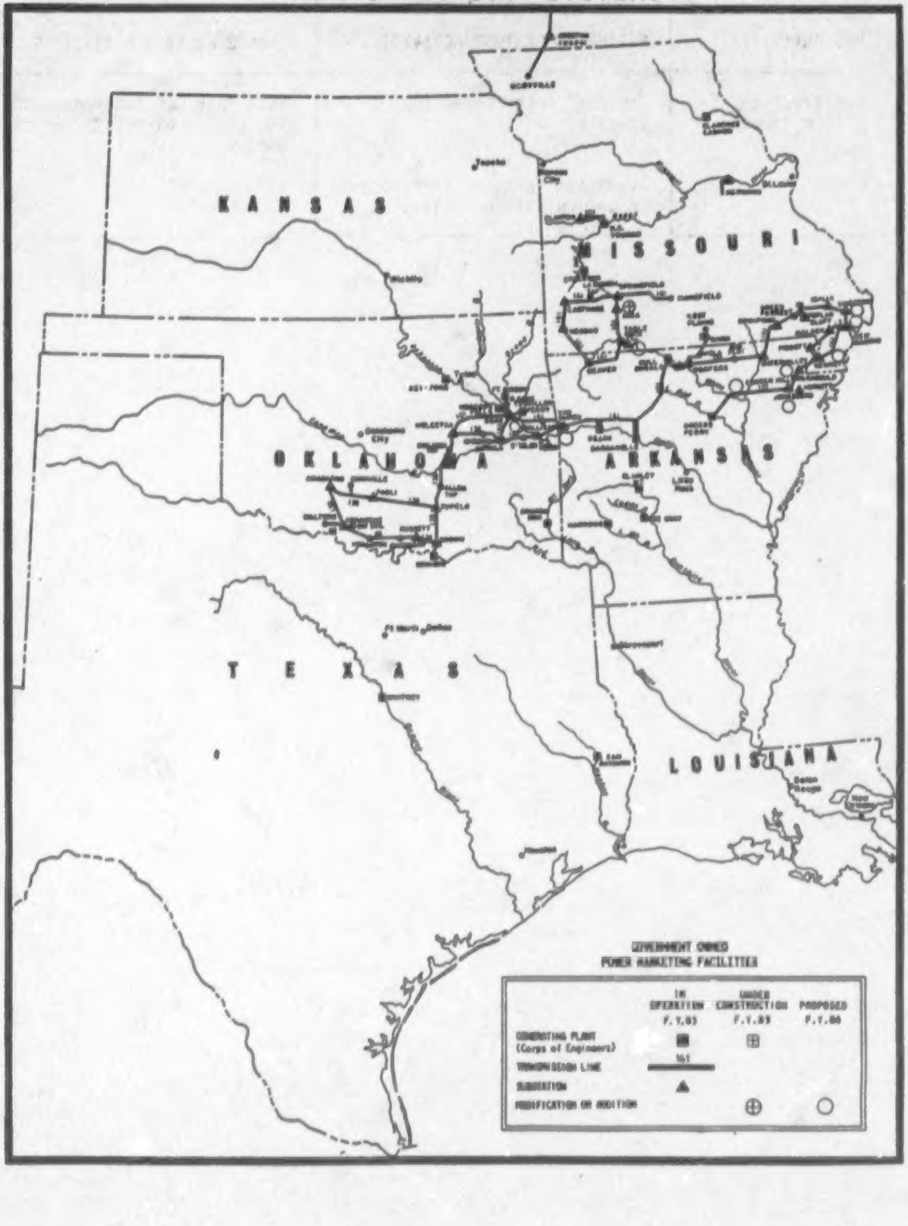
Southwestern Power Administration

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Operation and Maintenance	Dispatch power and energy in six state area.	Dispatch power and energy in six state area.
	Develop resource and marketing analysis.	Develop resource and marketing analysis.
	Negotiate and administrate power contracts.	Negotiate and administrate power contracts.
	Prepare rate and repayment studies.	Prepare rate and repayment studies.
	Maintain high voltage lines, sub and switching stations, and radio and microwave stations.	Maintain high voltage lines, sub and switching stations, and radio and microwave stations.
	Provide management and direction to all activities from the offices of Administrator, Public Affairs, Chief Counsel, Human Resource Development, and the Division of Administrative Management.	Provide management and direction to all activities from the offices of Administrator, Public Affairs, Chief Counsel, Human Resource Development, and the Division of Administrative Management.
Purchase Power and Wheeling	Purchase and wheel the power and energy needed to meet contractual commitments.	Purchase and wheel the power and energy needed to meet contractual commitments.
Construction	Provide system metering, relaying and communications.	Provide system metering, relaying and communications.
	Continue minor modifications to transmission system.	Continue minor modifications to transmission system.
	Retire temporary substation serving the city of Nixia, MO, and provide a permanent structure.	Initial involvement in Arkansas Power and Light Company interconnection.
	Acquire capital equipment not related to construction for use in preventive and remedial maintenance.	Acquire capital equipment not related to construction for use in preventive and remedial maintenance.
	Contract for engineering services to assist agency engineering effort.	Contract for engineering services to assist agency engineering effort.

Key Activity Summary
(continued)

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Construction (continued)	Regional Interconnection studies. Study and initiate improvements in communication facilities.	Table Rock Dam interconnect with Empire District Electric Company.

DEPARTMENT OF ENERGY
SOUTHWESTERN POWER ADMINISTRATION
TRANSMISSION SYSTEM


KANSAS
MISSOURI
OKLAHOMA
ARKANSAS
TEXAS
LOUISIANA
Wichita
GOVERNMENT OWNED
POWER MARKETING FACILITIES
IN OPERATION F.Y.83
UNDER CONSTRUCTION F.Y.85
PROPOSED F.Y.86
GENERATING PLANT (Corps of Engineers)
TRANSMISSION LINE
161
SUBSTATION
MODIFICATION OR ADDITION

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
SYSTEM STATISTICS

SOUTHWESTERN POWER ADMINISTRATION
(In thousands of dollars)

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Estimate
Generating capacity:			
Installed capacity (kW)	1,983,100	2,009,800	2,089,800
Peak capacity (kW)	1,953,000	2,037,700	2,094,400
Generating stations:			
Generating projects (No.)	22	22	22
Substations/switchyards (No.)	30	30	30
Substations/switchyards (KVA capacity)	1,033,434	1,033,434	1,033,434
Available energy:			
Energy generated (megawatt-hours)	4,676,900	5,502,000	5,502,000
Energy purchased (megawatt-hours)	365,600	712,500	624,800
Energy available for marketing (megawatt-hours)	4,615,100	5,295,800	5,467,300
Transmission lines (circuit miles):			
161 kV	1,119	1,119	1,119
138 kV	347	347	347
69 kV	194	194	194
Total circuit miles	1,660	1,660	1,660
Revenues:			
Adjusted gross power revenues a/	$ 67,100	$ 65,200	$ 91,500
Prior year adjustment	--	--	--
Total power revenues	$ 67,100	$ 65,200	$ 91,500
Federal investment allocated to commercial power:			
Generation equipment	$ 617,200	$ 749,000	$ 752,200
Transmission facilities	68,000	81,500	90,400
Total investment	$ 685,200	$ 830,500	$ 842,600

a/ Includes power sales, wheeling and other revenues.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED OR EXCHANGED BY SYSTEM

Southwestern Power Administration

System	State	No. of Plants	Installed Capacity (kW)	FY 1982 1/ Actual Pwr (GWH)	FY 1983 Estimated Pwr (GWH)	FY 1984 Estimated Pwr (GWH)
Power Marketed						
(Interconnected System)	Missouri	3	298,500	1,514	1,860	2,004
	Arkansas	9	1,021,000	1,384	1,469	1,088
21 projects	Oklahoma	7½ 2/	546,600	920	1,137	1,251
	Texas	1½ 2/	65,000	500	496	584
	Louisiana	0	0	48	48	170
	Kansas	0	0	117	171	256
	WAPA 3/	0	0	75	0	0
Subtotals		21	1,931,100	4,558	5,181	5,353
Isolated						
Sam Rayburn Project	Texas	1	52,000	29	57	57
50% to TX; 50% to LA	Louisiana	0	0	28	57	57
Subtotals		1	52,000	57	114	114
Total, power marketed		22	1,983,100 4/	4,615	5,295	5,467
Power Exchanged				298	154	138
Power Wheeled (megawatts)				356	375	367

1/ Represents power delivered to customer in designated state.

2/ 1 Unit of 2 Unit Denison Project to Texas; 1 Unit of 2 Unit Denison Project to Oklahoma.

3/ For disposition to the Western Area Power Administration in the Missouri River Basin.

4/ Includes 53,300 kW Harry S. Truman Project presently in service and 26,700 kW assumed to be available in FY 1983 and 80,000 kW assumed to be available in FY 1985.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Conservation and Renewable Energy - Plant and Capital Equipment
Conservation and Renewable Energy - Southwestern Power Administration
Power Marketing - Southwestern Power Administration

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Minor system construction modifications various locations in Arkansas, Missouri, and Oklahoma.

2. Project No. None

3. Date A-E work initiated: Annual Funding

3a. Date physical construction starts: Oct. 1, 1983 - continuous small projects

4. Date construction ends: September 30, 1983

5. Previous cost estimate: None
Less amount for PE&D: N/A
Net Cost estimate: None
Date: N/A

6. Current cost estimate: $2620
Less amount for PE&D: N/A
Net cost estimate: $2620
Date: 5/82

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	-0-	$2620	$2620	$2620

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Minor system construction modifications various locations in Arkansas, Missouri, and Oklahoma. Project No. None

8. Brief Physical Description of Project:

This project provides for the construction of minor changes in the electric transmission system. This includes known equipment change out made necessary by increased loadings and system deterioration as well as unforseen requirements as necessitated by operating as a member of an interconnected power pool. In addition, new facilities by others, such as highways, etc., often require minor changes in Southwestern facilities, sometimes on a reimbursable basis, but, requiring an actual expenditure of appropriated funds. The amount herein will allow Southwestern to respond in a timely manner to these developments.

9. Purpose, Justification of Need For and Scope of Project:

a. System Metering, Relaying and Communications $920,000 - Southwestern communication facilities transverse large portions of three states. These facilities are composed of power-line carrier, VHF and UHF radio, leased telephone circuits and space on equipment owned by others, all of varying age and condition. The continued integration of Southwestern's transmission lines with other utilities, in addition to the operating and control data required by dispatchers, mandate an extensive and reliable communication system. These funds will provide for the systematic improvement to the communications system in accordance with a long range plan being developed with the Corps of Engineers and other interconnected utilities. In addition their funds will provide for modifications and additions to the protective relaying facilities, metering, telemetering, and load frequency control, facilities. Changes in contractual arrangements by customers and other interconnected utilities can be expected. These problems and changes frequently require circuit revisions and equipment additions.

b. Minor Modifications on Existing Facilities $995,000 - Continued load growth plus additional interconnections has resulted in the busses, oil circuit breakers, and switches reaching their maximum ampacities at some substations. Serious damage to other equipment presently in the stations could result if adequate size busses, breakers, and switches are not installed.

c. Arkansas Power and Light Company (APL) Interconnect $280,000 - A joint planning study concerning improvements to the electric system in Northern Arkansas has just been completed. One recommendation of this study concerns an interconnection of Government owned transmission facilities with those of APL. These funds would provide initial Government involvement pending final negotiations with the private utilities.

d. Table Rock Dam Interconnect With Empire District Electric Company (EDE) $65,000 - A contract initiated in 1980 provides for an interconnection at Table Rock Dam with the Empire District Electric Company. EDE is to be responsible for all costs associated with this project, required by the interconnection and installed by Southwestern personnel.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Minor system construction modifications various locations in Arkansas, Missouri, and Oklahoma. Project No. None

9. e. Architectural and Engineering Service (A&E) $360,000 Southwestern has suffered a reduction in its Engineering Staff and although some success has just been achieved in recruitment, a full complement of trained Engineers will not be available in the near future. The requested funds will provide for contracted engineering services. It is intended that an A&E firm would assist on an individual project basis with no project cost to exceed $100,000. Such project would include the design of new transmission lines and substations, land surveys, environmental assessments, design of relay and control circuits and similar modifications to the electrical system.

10. Detail of Cost Estimate:	Item Cost	Total Cost
a. Engineering Design and inspection Costs at 18% of Construction Cost	$670	$670
b. Land and Land Rights - N/A - No land acquisition anticipated		
c. Construction Costs:		
1. System Metering, Relaying and Communication		
(a) Miscellaneous Relaying and Metering Additions	200	
(b) Communications and Control Additions	220	
(c) Miscellaneous Materials and Parts	75	495
2. Minor Modifications		
(a) Replacement of 161 kV Oil Circuit Breakers at Van Buren, Gore, and Doniphan	450	
(b) Replace 161 kV switches, Jonesboro, Paragould, Kennett, N. Madrid, Sikeston	200	
(c) Replace 400 MHZ UHF System, Jonesboro to Norfork	200	
(d) Miscellaneous System Modifications	55	905
3. Arkansas Power & Light Company Interconnect	200	200
4. Table Rock Interconnect - Empire District Electric Company	50	50
5. A & E Engineering Service	300	300
Total Project Cost		$2,620

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Minor system construction modifications various locations in Arkansas, Missouri, and Oklahoma. Project No. None

11. Method of Performance:

The components of the project will be procured by solication of competitive bids and contracts awarded will be lump-sum based on low responsive bid. Installation of the materials will be accomplished by agency forces.

12. Not required.

13. Not required.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Conservation and Renewable Energy - Plant and Capital Equipment
Conservation and Renewable Energy - Southwestern Power Administration
Power Marketing - Southwestern Power Administration

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Capital Equipment not Related to Construction.

2. Project No. None

3. Date A-E work initiated: Annual Funding

3a. Date physical construction starts: October 1, 1983 - Continous small projects.

4. Date construction ends: N/A

5. Previous cost estimate: None
Less amount for PE&D: N/A
Net Cost estimate: N/A
Date: N/A

6. Current cost estimate: $1,080
Less amount for PE&D: N/A
Net Cost estimate: $1,080
Date: 5/82

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	0	$1,080	$1,080	$1,080

CONSTRUCTION PROJECT DATA SHEETS

7. Title and location of project: Capital Equipment not Related to Construction   Project No. None

8. Brief Physical Description of Project:

This project is comprised of multiple capital equipment purchases not related to construction required in providing maintenance of Southwestern's power system, comprised of 1645.3 circuit miles of high voltage transmission lines, 29 substations, and 20 radio and microwave stations. The new equipment purchases will enable replacement of similar equipment which is underrated, worn out, deteriorated, or damaged. This equipment includes high voltage oil circuit breakers, transmission line wood poles, crossarms, and insulators, specialized maintenance vehicles, protective equipment with insufficient load carrying ability, diagnostic test equipment, and electronic equipment.

9. Purpose, Justification of Need For, and Scope of Project:

The equipment purchases are required to enable preventive and remedial maintenance of the high voltage power system which insures uninterruptable, safe, and reliable delivery of electric energy to Southwestern's customers.

As most of the transmission facilities were installed in the 1950's, they are either reaching the end of their expected service life or energy load growth has surpassed equipment design load ratings, and therefore the facilities need to be replaced or uprated. The average age of the wood poles which comprise the structures supporting the high voltage transmission lines is over 25 years. Consequently, as the average expected life of a wood pole in the Southwest is 30 to 40 years, an increase in pole replacements is required. Similar situations exist with specialized high voltage switchgear, communications auxiliary equipment, and electronic equipment replacement.

Vehicles, tractors, trailers, and equipment necessary in the performance of system operation and maintenance functions which are scheduled for replacement are in accordance with DOE and GSA usage and replacement guidelines. Vehicle and equipment replacement occurs on a cyclic basis which developed due to replacement restrictions implemented in the 1970's. Therefore,a large number of replacements are necessary due to numerous vehicles simultaneously being purchased after restrictions were suspended.

Test equipment scheduled for replacement includes specialized or unique equipment to perform diagnostic test on new technology electronic equipment as well as replacing worn out test equipment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Capital Equipment not Related to Construction Project No. None

10. Details of Cost Estimate:	Item Cost	Total Cost
a. Engineering, O&M Costs	$ -0-	
b. Capital Equipment not Related to Construction Costs		
(1) Line Equipment	270	
(2) Substation Equipment	200	
(3) Test Equipment	108	
(4) Electronic Equipment Replacement	200	
(5) Vehicles and Equipment	230	
(6) Miscellaneous	72	
		$1,080

11. Method of Performance:

The components of the project will be procured by solicitation of competitive bids and contracts awarded will be lump-sum based on low responsive bid. Installation of the materials will be accomplished by agency forces.

12. Not required.

13. Not required.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Pending Litigation

Southwestern Power Administration

Associated Electric Cooperative, Inc. (AECI)

On August 12, 1970, AECI filed a lawsuit against SWPA wherein they sought declaratory and injunctive relief from the application of an annual $2,600,000 rate schedule transmission charge for service furnished AECI under their contract with SWPA. AECI's Motion for Summary Judgment was granted by the District Court for the District of Columbia on January 8, 1973. On November 18, 1974, the Court of Appeals for the District of Columbia reversed the District Court decision and remanded the case for resolution of issues of fact (507 F 2d 1167). On August 25, 1977, the court dissolved its injunction of January 8, 1973, and ordered AECI to begin immediate payment of the transmission service charge and one-half of the charges accrued since 1970. After a period of negotiation the contract between AECI and SWPA was amended. The amendment became effective on April 1, 1981. With the enactment of this amendment Public Law 95-456 became effective and SWPA ceased billing the transmission service charge. With respect to the transmission service charge, SWPA has collected approximately $19,068,000 through March 31, 1981, and the balance approximately $9,361,000, plus total interest of approximately $6,244,007.91 as of this date, is included in accounts receivable. Personnel from AECI and SWPA met and negotiated a tentative settlement to this pending litigation. Under the terms of this agreement SWPA will retain $19,315,654.85 and AECI will retain $9,361,345.15. In addition, SWPA will deliver a quantity of hydroelectric energy to AECI at no additional costs and forego revenue of approximately $1.4 million. This agreement has yet to be approved by the legal counsels for both litigants and submitted to the Court for its approval. It is hoped that the proposed settlement will be endorsed. If the settlement is not approved, a trial will be necessary to determine the proportion of monies to be allocated to each party. At this time SWPA is unable to predict the final outcome of this proceeding.

Tex-La, Sam Rayburn and NTEC

On July 29, 1980, August 7, 1980, and on March 17, 1981, the Justice Department on behalf of SWPA filed lawsuits against Tex-La Electric Cooperative, Inc. (TEX-La), Sam Rayburn Dam Electric Cooperative, Inc. (Sam Rayburn) and Northeast Texas Electric Cooperative, Inc. (NTEC), respectively. The lawsuits were filed to collect amounts due and owing, but the parties refused to pay. Each party challenged the authority of the Government to place rates into effect on an interim basis. On September 16, 1981, and December 9, 1981, the courts granted Motions for Summary Judgment in favor of Tex-La and NTEC. These two decisions were joined on appeal to the Fifth Circuit Court of Appeals. On November 26, 1982, the Court for the Fifth Circuit reversed the two lower courts' decisions. Tex-La and NTEC have 60 days from the date of decision to perfect an appeal to the United States Supreme Court. At this time SWPA is unable to predict if an appeal will be taken by Tex-La and NTEC. The amounts at issue in this litigation is $486,408.00 plus interest of $151,063.25 as of December 1, 1982, for Tex-La and $1,003,238.05 plus $235,837.50 in interest for NTEC as of this writing.

On October 27, 1982, the United States District Court for the Southern District of Texas granted Sam Rayburn's Motion for Summary Judgment. Although this case was reversed, in dicta, by the Tex-La and NTEC decision, a formal appeal will be filed in this case to the Fifth Circuit Court of Appeals on or before December 27, 1982. At issue in this litigation is $507,524.86 in principal and $148,821.40 in interest as of December 2, 1982. It is predicted that the Fifth Circuit Court of Appeals will follow their previous decision in the Tex-La and NTEC appeal and reverse the decision of the lower court.

Fulton, Thayer, Piggott, and Lamar

On September 18, 1980, four city customers of SWPA, Fulton, Lamar, and Thayer, Missouri and Piggott, Arkansas filed a lawsuit against SWPA in the Court of Claims. In their lawsuit the cities challenged the authority of SWPA to collect rates assessed on an interim basis. They asked the Court to order SWPA to refund those funds collected under the interim rates from them. On May 19, 1982, the Court entered a Judgment for the cities. The decision holds that interim rates cannot be assessed. A hearing will be held sometime next year to determine the exact amount of damages due to the four cities. In light of the fact that this decision is directly opposite to holding of the decision in the Fifth Circuit Court of Appeals regarding Tex-La and NTEC, SWPA will ask the Justice Department to seek an appeal to the United States Supreme Court.

EEOC Litigation

On July 27, 1982, an employee of SWPA, Mr. Reynard E. Spence, filed suit against the United States in the Federal District Court for the Northern District of Oklahoma. In the suit, Mr. Spence alleges that the SWPA violated his civil rights when the agency failed to select him for a certain advertised position. Specifically, he alleges there was discrimination because of age. He is asking for a judgment against the United States in the amount of $200,000. At this time SWPA is unable to predict the outcome of this litigation.

State of Arkansas

On November 12, 1982, the State of Arkansas filed suit against the United States in the Federal District Court for the Eastern District of Arkansas in Little Rock. In this litigation Arkansas asks the Court to enjoin SWPA from marketing power and energy in accordance with the Final Power Allocation 1980-1988. If the State prevails, the Court system could direct the SWPA in allocating power to its customers.

Department of Energy
Power Marketing
Southwestern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Continuing Fund				
Emergency Expenses	---	---	---	---

Authorization: 16 U.S.C. 825s

The Southwestern Power Administration Continuing Fund of $300,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southwestern area, is available to defray emergency expenses necessary to insure continuity of service.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

WESTERN AREA POWER ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Construction, Rehabilitation, Operation and Maintenance Western Area Power Administration

For carrying out the functions authorized by Title III, Section 302(a)(1)(E) of the Act of August 4, 1977 (Public Law 95-91), and other related activities including conservation and renewable resources programs as authorized, including the purchase of passenger motor vehicles (not to exceed nine for replacement only) purchase, maintenance, and operation of one aircraft, $219,630,000, to remain available until expended, of which $198,430,000, shall be derived from the Department of the Interior Reclamation fund and $1,004,000, shall be derived from the Colorado River Dam fund for power marketing and transmission expenses of the Boulder Canyon Project.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

WESTERN AREA POWER ADMINISTRATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL.			
ES-6			
ES-5	1	1	1
ES-4	1	1	1
ES-3	2	3	3
ES-2	2	3	3
ES-1	3	4	4
SUBTOTAL.	9	12	12
GS-18			
GS-17			
GS-16			
GS/GM-15	16	16	16
GS/GM-14	53	53	53
GS/GM-13	112	112	114
GS-12	196	196	210
GS-11	117	117	131
GS-10	9	9	11
GS-9	61	61	69
GS-8	23	23	24
GS-7	66	70	76
GS-6	42	44	44
GS-5	79	79	82
GS-4	34	34	34
GS-3	13	14	14
GS-2	3	3	3
GS-1			
SUBTOTAL.	824	831	881
UNGRADED	427	427	445
TOTAL PERMANENT POSITIONS	1,260	1,270	1,338
UNFILLED POSITIONS, END OF YEAR . . .			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	1,260	1,270	1,338

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
Western Area Power Administration
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$149,750	$219,630
Proposed Supplementals	---	---
Subtotal, Budget Authority	$149,750	$219,630
Receipts and Reimbursements		
Unobligated Balances, Start of Year	$ 66,713	$ ---
Unobligated Balances, End of Year	---	---
Credits (net billings) from Power Users	12,277	14,402
Offsetting collections from Federal Funds	12,000	15,000
Total, Obligations	$240,740	$249,032

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
Power Marketing - Western Area Power Administration

The Western Area Power Administration (Western) was created by Section 302 of the Department of Energy Organization Act of 1977 (Public Law 95-91). Paragraphs (1) (E) and (1) (F) of Section 302 transfer to the Secretary of Energy the power marketing functions of the Bureau of Reclamation, including the construction, operation and maintenance of transmission lines and attendant facilities; and the transmission and disposition of electric power and energy generated at Falcon Dam and Amistad Dam, international storage projects on the Rio Grande River.

Western's statutory authority regarding marketing and transmission systems has its origin in the body of law developed over the last century and commonly known as Federal Reclamation law which is based on the Reclamation Act of 1902, as amended and supplemented. This act forms the basis for most of Western's activities. However, subsequent acts, particularly the Reclamation Act of 1939 and the Flood Control Act of 1944, have set forth the conditions under which Federal power can be marketed.

In the marketing of power, one of the most important conditions or limits has been the preference concept. The preference clause which has current application is found in Section 9 of the Reclamation Project Act and states:

> . . . in said sales or lease preference shall be given to municipalities and other public corporations or agencies; and also to cooperatives and other nonprofit organizations financed in whole or in part by loans made pursuant to the Rural Electrification Act of 1936 and any amendments thereof.

In accordance with Section 9 of the Reclamation Project Act, power sales are made at rates which will produce revenues that are sufficient to cover appropriate shares of the annual operation and maintenance cost, interest on the construction investment, and various other fixed charges. Departmental policies and specific project authorization acts provide for repayment periods and interest rates.

As an administration within the Department of Energy, Western is subject to all laws applicable to Federal agencies. Those that are especially noteworthy with respect to the marketing and transmission of Federal power are the Administrative Procedures Act, the National Environmental Policy Act, and the Public Utility Regulatory Policies Act.

Alternatives to Federal operation and management of the present systems are limited by the complex relationships of the power marketing program to the diverse objectives of the Federal water resources management programs. Power will continue to be generated and transmitted from Federal dams in accordance with legislated multipurpose project objectives such as flood control, irrigation, international and Indian treaty commitments, recreation, safety and environmental objectives.

Program Goal, Long Range Objectives, and Accomplishments

Western's program goal is to implement national energy policy by providing reliable electrical service while optimizing energy conservation and the use/development of renewable resources. Specifically, Western:

- Assures economical, reliable and cost efficient hydropower is available from Federal powerplants to over 400 customers in a geographic area encompassing 1.3 million square miles in 15 central and western states
- Markets all power at the lowest possible rates consistent with sound business principles to recover the costs of operation and capital invested in power with interest as well as capital invested in non-power facilities
- Repays reimbursable capital investment within a reasonable period, usually 50 years
- Gives preference in the sale of power to public bodies and cooperatives
- Constructs and operates transmission lines to achieve a high degree of power system reliability

Western's primary long-range objective is to maintain a workable and progressive power marketing program that will continue to provide efficient and reliable electrical energy to power customers. Major activities include the development of power marketing plans and the development and adjustment of power rates. Western must further maintain an adequate and reliable transmission system in order to deliver Federal power to customer delivery points, transfer energy from renewable resources, and displace oil-fired generation. This entails an active program of conducting transmission system planning and operational studies and a responsive planning, design, and construction program for those facilities identified as necessary for mission accomplishment. An additional long-range objective is development and implementation of an active conservation and renewable energy program for in-house application and implementation with power customers in conjunction with the power marketing program.

Western's high-voltage transmission system, which overlays a vast network of lower voltage lines, is used to move large quantities of electric energy and is part of a larger interconnected network covering the West. Network reliability is the measure by which Western's operation can be evaluated. Network reliability can be defined as the ability to withstand severe emergency conditions without uncontrolled cascading tripouts of system components which in turn lead to widespread power outages or blackouts. Minimum reliability criteria for system planning and operations, as established by the National Electric Reliability Council region in which Western operates (the Mid-Continent Area Reliability Coordination Agreement and the Western Systems Coordinating Council), are used as standards in assessing Western's system operation.

As of September 30, 1982, the total Federal investment to be repaid by Western's power systems was $3.7 billion of which $1.3 billion has already been repaid. Revenues to the U.S. Treasury from Western's systems have totaled $4.7 billion. That sum has provided $1.4 billion for operation and maintenance, $1.0 billion for purchased power, $1.0 billion for interest, and $1.3 billion for repayment of investment in power facilities and assistance to irrigation projects.

For FY 1984, Western's agency-wide objectives (in order of lead table activities) are:

Construction and Rehabilitation

- Plan, design, and construct facilities to assure that Western's power transmission system will be adequate and reliable to deliver power to customer delivery points, to transfer energy from renewable resources, and to displace fossil-fired generation when possible

Operation and Maintenance

- Conduct an operation, maintenance, and replacement program in order to provide reliable service to Western's customers in a cost-effective manner
- Plan and manage energy supplies
- Plan and implement an effective conservation and renewable energy program

Purchase Power and Wheeling

- Purchase energy to meet contractual obligations and participate in the oil conservation program

Under current policy Western anticipates the need for significant outyear increases in annual appropriations. This significant increase is due primarily to the need to purchase high-cost energy to meet firm contractual obligations for the Central Valley Project in California. Western will continue to identify economical sources of firming energy to blend with and augment Federal generation and use of low-cost banked energy. Efforts are under way to reduce these outyear budgetary requirements as well.

Also to accomplish these objectives, Western is allocated an employment level of over 1,400 full-time equivalents annually as a base-level staffing requirement. Western continues to contract out services, where feasible, in accordance with OMB Circular A-76 principles, while operating in a cost-effective, businesslike manner under power utility operation standards.

Following, by lead table activity, are accomplishments, specific objectives, and justification for the FY 1984 program.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
Western Area Power Administration

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Power marketing - Western Area Power Administration (Western)				
Construction:				
Operating expenses	$101,400	$ 71,786	$ 72,166	$ 78,767
System operation and maintenance:				
Operating expenses	56,174	52,800	54,557	72,863
Purchase power and wheeling:				
Operating expenses	53,200	25,164	25,164	68,000
Total, Operating expenses	$210,774	$149,750	$151,887	$219,630
Staffing				
FTP/Total FTEs	1,058/1,132	1,066/1,129	1,066/1,129	1,128/1,201

Authorization: Sec. 302(a)(1)(E), P.L. 95-91 and various project authorizations.

Summary of Changes

FY 1983 Appropriation enacted	$149,750
Built-in increases and decreases:	
Increase to Standard Level User Charge (rent) costs	+317
Increase for statutory pay cost increases	+1,521
Increase for Government share of Medicare	+425
Decrease in compensable workdays	-126
FY 1984 base	$151,887
Program increases and decreases:	
Net increase in construction and rehabilitation of existing and new power facilities	$ +6,601
Net increase for replacements and additions, materials, supplies and other operation and maintenance expenses	+18,306
Purchase power and wheeling program increase for energy purchases and wheeling costs	+42,836
FY 1984 budget request	$219,630

CONSTRUCTION AND REHABILITATION
GENERAL STATEMENT

Summarized Financial Data

Fiscal Year 1983	
Appropriation	$ 71,786,000
Application of Prior Year Funds	28,308,891
Total FY 1983	$100,094,891
Fiscal Year 1984	
Estimate of Appropriation	$ 78,767,000
Total FY 1984	$ 78,767,000

Western's construction program is required in order to continue to satisfy obligations for delivery of power and energy. These requirements change as the interconnected power systems, of which Western is a part, grow and evolve. As a result of interconnections, transmission line loading is no longer solely a function of Western's resources and loads but is influenced by load and resource arrangement of the systems with which it interconnects. Furthermore, disturbances in one system reflect throughout the interconnected systems. Thus, where necessary to assure reliable operation of its transmission system, Western upgrades or adds to its facilities. To the maximum extent possible, the cost of system upgrading is shared with neighboring utilities who also benefit from the resulting interconnected system transmission capacity. Interconnection and increased transmission capacity allow exchange of power and energy between utilities. This facilitates greater utilization of lower-cost sources of energy and a minimum duplication of facilities. This potentially allows purchase of lower-cost energy from more distant sources to meet firming requirements.

Western's construction activity is made up of two basic components: (1) items related to the rehabilitation and upgrade of existing facilities, and (2) new facilities. Whether rehabilitating and upgrading existing facilities or constructing new facilities, Western's construction activities often involve joint projects with other utilities. This is done to take advantage of existing facility sites and line rights-of-way and to achieve economy of scale by developing one large project in lieu of two or more smaller projects. Costs for such joint projects are apportioned among the various participants according to their respective needs and benefits derived from their use of the facilities. The size of Western's share of joint projects is based on studies to determine capacity needed to meet Western's legislative and contractual commitments.

Western has requirements to rehabilitate and upgrade existing facilities to:

- Replace worn out equipment and facilities which are beyond their useful lives, thereby reducing outages and lowering maintenance costs.

- Replace overloaded equipment and facilities with higher capacity components to avoid outages.

- Replace aging and damaged wood-pole transmission structures with either new wood poles or steel structures. These activities reduce maintenance costs and eliminate hazards to Western's maintenance crews and the general public.

- Upgrade portions of Western's transmission system facilities to increase reliability of operations; meet current safety, environmental, and conservation standards; maintain or increase the efficiency of operation and maintenance work; serve increased customer loads; and more effectively utilize existing rights-of-way to avoid purchase of new rights-of-way.

Western has requirements for new transmission facilities to:

- Improve the transmission system's stability and reliability to avoid major outages.

- Interconnect with other systems to take advantage of differing load patterns between regions which allows distributing peakloads between the systems.

- Provide increased joint transmission capacity to transfer lower-cost nuclear and coal-fired generation to offset Western purchases of higher-cost oil- and gas-fired generation and to earn wheeling revenues to offset costs of new facilities. Coal-fired energy is available at a rate of about 20 mills/kWh, while oil-fired energy costs run twice that.

- Increase power transfer capability between Western's eastern and western transmission systems to increase system operations and efficiency and allow transfer of hydroelectric and coal-fired generation to reduce Western's purchases of higher-cost oil-fired generation.

- Provide increased transmission capacity to reduce the overburdening of Western and other utilities' interconnected transmission facilities.

- Increase Western's oil conservation program, which has been limited in recent years by a lack of transmission capacity. This program consists of purchase of coal-fired energy to meet Western's loads during offpeak periods. Water saved in this manner is released to replace high-cost oil- or gas-fired energy which would have been needed onpeak by neighboring utilities. Savings are split between Western and the other utilities involved.

In many instances the need for new transmission facilities is determined through Western participation in joint planning with other interconnected utilities. The proportionate responsibility for new facilities is based on each utility's share of generation resources and loads served. Any new transmission capacity in excess of Western's current needs is used to wheel firm or nonfirm energy for others, providing revenues to offset costs.

Accomplishments:

- During 1981, the first major transmission project undertaken since Western's establishment was essentially completed. The finished Montana and South Dakota portions of the 328-mile long Miles City-New Underwood 230-kV Line (the Montana-Dakota Utilities Company of Bismarck, North Dakota, was project manager for the North Dakota portion) represent a significant addition to Western's transmission system. The primary objective was to provide a single transmission line that would satisfy the needs of all area utilities.

  The majority of other construction activities completed to date include transmission system improvements and upgrades to improve system reliability and reduce line losses. Included are replacement and rehabilitation of wood-pole transmission structures, upgrading and/or adding equipment at substations, switchyards, and other facilities.

- Western awarded a contract in FY 1982 for the Miles City AC-DC-AC Converter Station. This facility is being built under a joint construction and financial arrangement with the Basin Electric Power Cooperative and will provide a 200-megawatt connection between the Eastern and Western transmission systems. This interconnection will establish a firm path to balance load and resource obligations of Federal/non-Federal power suppliers on both sides of the east-west separation. Another major benefit will be added capability to transmit coal-fired surpluses from the midwest to displace oil-fired generation on the Pacific coast.

- Construction was completed in FY 1982 on the Power Marketing Operations Complex near Loveland, Colorado. These facilities will serve as an area control center for the Colorado-Wyoming-Nebraska area.

- Construction was completed on 13 substation additions and 284 miles of transmission lines in FY 1982; 9 substation additions and 122 miles of transmission lines are planned to be completed in FY 1983.

- Western inspected 362 miles of wood-pole transmission structures and replaced 1,981 wood poles during FY 1982. Western plans to inspect 558 miles of transmission structures in FY 1983.

Objectives:

- Continue to plan, design, and construct essential transmission lines, substations, and other facilities, sharing these efforts with neighboring utilities to the maximum extent possible. Western plans to complete construction on nine substation additions, 158 miles of transmission lines, and inspect 489 miles of transmission structures in FY 1984.

- Complete construction of the Miles City AC-DC-AC Converter Station by mid-1985.

- Provide for continuing replacement and rehabilitation of deteriorated wood-pole transmission structures. Western has some 8,400 miles of wood-pole lines. Of these, 4,850 miles of line are over 30 years old, 1,600 are from 25 to 29 years old, and 700 miles are 20 to 24 years old. Normal life of a wood-pole structure is 35 years, but proper treatment at 15 to 20 years and again at 30 to 35 years can extend the normal life to 55 years. Approximately 77 percent of the wood structures exceed the normal 35-year service life; and 25 percent of these exceed the extended service life.

FY 1984 Request:

Western is requesting $78,767,000 for construction and rehabilitation work in FY 1984. This amount plus the application of $14,328,000 of advances from non-Federal sources will provide for activities on the Great Falls-Conrad 115-kV Transmission Line and terminal facilities in Montana, the Liberty-Coolidge 230-kV Transmission Line and terminal facilities in Arizona, the Thermopolis-Alcova 230-kV Transmission Line and terminal facilities in Wyoming, the Gering-Archer 115-kV Transmission Line rehabilitation in Nebraska and Wyoming, and the acquisition and installation of the Billings Area Microwave System in several northcentral states.

This request will continue ongoing construction work including: the Miles City converter station to interconnect east-west power systems; 345-kV transmission systems in western Colorado and northern New Mexico to improve system reliability and provide additional capacity; and the Coolidge-Saguaro 115-kV Transmission Line to correct system overloading in the area. Work will continue on replacement and rehabilitation of transmission structures, facility planning, field investigations, environmental analysis, land acquisition activities, and on engineering studies including preconstruction activities on future transmission facilities.

The following tabulations and power system data sheets explain Western's construction program in more detail:

Department of Energy
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
Western Area Power Administration

CONSTRUCTION SCHEDULE
(In thousands of dollars)

Power System	Estimated Total	Total to 9-30-82	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Remaining Balance
Boulder Canyon	$ 11,000	$ ---	$ ---	$ ---	$ ---	$ ---	$ 1,000	$ 10,000	$ ---
Central Valley	167,297	29,583	14,433	9,055	12,010	11,227	9,004	5,140	76,845
Colorado River Basin Salinity Control - Title II	973	---	---	61	912	---	---	---	---
Colorado River Front Work and Levee System	91	34	57	---	---	---	---	---	---
Colorado River Storage Power System	296,725	31,360	43,308	19,748	27,330	15,767	18,010	11,754	129,448
Orland	730	---	---	---	---	---	---	---	730
Pacific Northwest-Pacific Southwest Intertie	489,098	4,850	800	2,758	2,668	469	494	603	476,456
Parker-Davis	69,663	6,946	4,610	8,331	11,820	19,564	11,241	4,414	2,737
Pick-Sloan Missouri Basin Transmission Division .	425,468	94,655	36,600	38,814	63,760	56,473	58,251	53,089	23,826
Washoe	638	61	287	---	---	---	---	---	290
Total Federal Obligations	$1,461,683	$167,489	$100,095	$ 78,767	$118,500	$103,500	$ 98,000	$ 85,000	$710,332
Method of Financing:									
Allotment Available and Required			$ 71,786	$ 78,767	$118,500	$103,500	$ 98,000	$ 85,000	$710,332
Application of Prior Year Funds			28,309	---	---	---	---	---	---

Department of Energy
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
Western Area Power Administration

(In thousands of dollars)

TPC*	Facility Title and Location	Phase	Funds Appropriated to 9-30-82	Total Obligations Planned	Total Obligations Actual	Total Cost Planned	Total Cost Actual	Remarks
$ 52,197	Miles City East-West D.C. Tie and Terminal Facilities - Montana 1/	Construction	$13,338	$13,338	$13,338	$ 948	$ 948	Joint participation project between Western and Basin Electric Power Cooperative.
$108,870	Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV Transmission Line - Colorado and New Mexico 2/	Construction	$27,652	$27,652	$ 7,993	$27,652	$ 4,631	Joint participation project between Western and Colorado-Ute Electric Association. Variance between planned obligations/cost and actual obligations/cost is due to the Public Utilities Commission denial of the Colorado-Ute Electric Association application for public convenience and necessity. Colorado-Ute Electric Association made a second application for public convenience and necessity with the Public Utilities Commission in May 1982.
$ 34,039	Thermopolis-Alcova 230-kV Transmission Line and Terminal Facilities - Wyoming 1/	Construction	$ 1,372	$ 1,372	$ 1,372	$ 1,023	$ 1,023	Involves uprating major portion of the 69-kV transmission system to 230 kV to serve customer loads.
$ 25,427	Liberty-Coolidge 230-kV Transmission Line and Terminal Facilities - Arizona 3/	Construction	$ 1,709	$ 1,709	$ 1,709	$ 1,643	$ 1,643	Includes rebuilding and upgrading 77 miles of existing 161- and 115-kV transmission line to 230 kV to serve customer loads.

*Federal funds only.

1/Part of the Pick-Sloan Missouri Basin Power System.
2/Part of the Colorado River Storage Project Power System.
3/Part of the Parker-Davis Power System.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Central Valley Power System

	Estimated Total	Cumulative Prior Years	FY 1983 Estimate		FY 1984 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$167,297	$ 29,583	$ 14,433	$ 12,268	$ 9,055	$ 9,861	$114,226
Total DOE obs/BO	$167,297	$ 29,583	$ 14,433	$ 12,268	$ 9,055	$ 9,861	$114,226
Non-DOE obs/BO							
Design and Construction	$ 210	$ 125	$ 85	$ 85	$ ---	$ ---	$ ---
Total Obligations/Outlays	$167,507	$ 29,708	$ 14,518	$ 12,353	$ 9,055	$ 9,861	$114,226
Method of Financing:							
Appropriations Available and Required			$ 13,294		$ 9,055		$114,226
Application of Prior Year Funds			1,139		---		---
Non-Federal Advances			85		---		---

POWER SYSTEM DATA SHEET - 2
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Central Valley Power System (continued)

Description, Objective, and Justification

The Central Valley Transmission System consists of 1,322 circuit miles of 69- to 500-kV transmission lines which interconnect 10 powerplants, 1 pumping plant, and 12 major substations. Western markets electric power to preference wholesale customers and others, and administers a sales, transmission, and interchange contract with the Pacific Gas and Electric Company (PG&E), the major private power utility in the area.

The objective of the program is to provide Western's customers with reliable electric power by increasing transmission system dependability and decreasing system line losses.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Transmission Line and Terminal Facilities	Continuing		$2,775,000

- Program estimate provides for continuing planning, environmental, field data collection, and land and rights activities for reconductoring and rehabilitation of Shasta-Cottonwood Nos. 3 and 4, 230-kV Transmission Line. Designs and specifications will be continued on various transmission lines. Work will continue on transmission line service to the Bureau of Reclamation pumping plants which are part of the San Felipe Division of the Central Valley Project.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Central Valley Power System (continued)

Transmission Line and Terminal Facilities (continued)	Construction Start	Construction Stop	FY 1984 Estimate
Substations	Continuing		$5,031,000
- Completing major portion of construction of additions to Keswick and Folsom Switchyards, continuing design of the Cottonwood shunt reactor, beginning construction of the Pacheco Substation, and performing planning, design, and other preconstruction activities on various substations.			
Other	Continuing		$1,249,000
- Completing construction of the Elverta, Tracy, and Keswick maintenance facilities and continuing minor modification to substantially completed facilities.			
		Total	$9,055,000

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

POWER SYSTEM DATA SHEET - 4
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

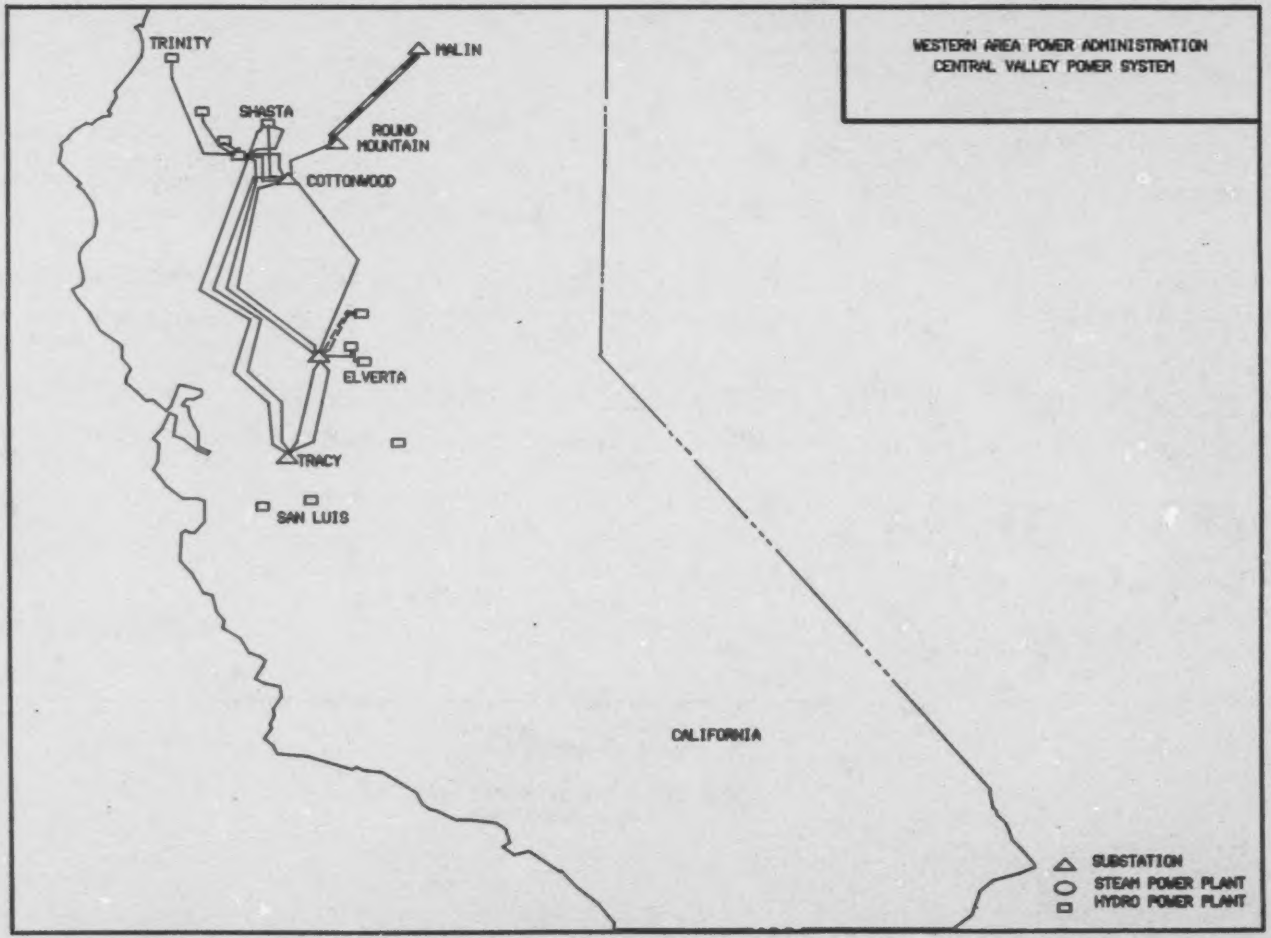
Central Valley Power System (continued)

C. Prior Year Achievements

- Completed Phase I of rehabilitating and reconductoring the Cottonwood-Elverta No. 3, 230-kV Transmission Line.

D. Current Year Planned Achievement

- Complete construction of Folsom-Nimbus Transmission Line rehabilitation. Western will also complete environmental activity and field data collection on phase II of Cottonwood-Elverta No. 3, 230-kV Transmission Line rehabilitation and reconductoring and the Cottonwood shunt reactor.



WESTERN AREA POWER ADMINISTRATION
CENTRAL VALLEY POWER SYSTEM

TRINITY
MALIN
SHASTA
ROUND MOUNTAIN
COTTONWOOD
ELVERTA
TRACY
SAN LUIS
CALIFORNIA
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Colorado River Storage Power System

	Estimated Total	Cumulative Prior Years	FY 1983 Estimate		FY 1984 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$296,725	$ 31,360	$ 43,308	$ 36,819	$ 19,748	$ 23,275	$202,309
Total DOE obs/BO	$296,725	$ 31,360	$ 43,308	$ 36,819	$ 19,748	$ 23,275	$202,309
Non-DOE obs/BO							
Design and Construction	$ 91,983	$ 5,248	$ 5,171	$ 4,395	$ 3,357	$ 3,629	$ 78,207
Total Obligations/Outlays	$388,708	$ 36,608	$ 48,479	$ 41,214	$ 23,105	$ 26,904	$280,516
Method of Financing:							
Appropriations Available and Required			$ 16,790		$ 19,748		$202,309
Application of Prior Year Funds			26,518		---		---
Non-Federal Advances			5,171		3,357		78,207

POWER SYSTEM DATA SHEET - 2
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Colorado River Storage Power System (continued)

Description, Objective, and Justification

The Transmission Division includes transmission lines, substation, switchyards, and other facilities to provide for the interconnection of storage project powerplants with each other, with participating project power facilities, with other Federal powerplants, and with the electrical facilities of the major investor-owned power companies in the Colorado River Basin area so that the greatest practicable amount of firm power and energy can be produced and delivered to the load centers for sale.

The objective of this project is to provide Western's customers with reliable electric power by increasing the transmission system's dependability and decreasing system line losses.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Craig-Rifle 345-kV Transmission Line Uprate	June 1982	1st Qtr 1984	$ 520,000
- Work will be completed on uprating Western's existing 95-mile 230-kV Craig-Rifle, Colorado, Transmission Line to 345-kV.			
Hayden/Craig to Shiprock/San Juan/Four Corners 345-kV Transmission System (Phase I)	1983	4th Qtr 1985	$14,487,000
- Joint Federal/non-Federal financial participation in the development of new and uprated transmission facilities in western Colorado and northern New Mexico consisting of approximately 550 miles of 345-kV transmission lines with nine substations. The initial requirement is part of a			

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Hayden/Craig to Shiprock/San Juan/Four Corners 345-kV Transmission System (continued)			

long-range phased development by power entities within the western Colorado, northwestern New Mexico region. Western and Colorado-Ute Electric Association have jointly planned to develop associated facilities that serve each party's long-range needs, including additional circuits between the Hayden-Craig area and the Shiprock-San Juan-Four Corners area. Joint planning studies conducted by Western and the major electric utilities of Arizona, Colorado, and Utah indicate the requirement of additional transmission systems between the Hayden-Craig area and the Shiprock-San Juan-Four Corner's area. This system expansion is required to provide for transmission of power from planned uprated existing resources and future conventional hydro and coal-fired generating facilities and future pump storage generating facilities to growing load centers. Future hydro additions are estimated to produce approximately 1,600 megawatts by the early 1990's. Additional transmission facilities would also enhance oil conservation, reduce purchase power costs, increase revenues from wheeling service, reduce problems associated with loopflows, and improve system reliability.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 4
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Transmission Line and Terminal Facilities	Continuing		$ 2,774,000
- Construction will be completed on the Dallas Creek Switchyard. Construction work on Hayden-Blue River 345-kV Transmission Line will continue. Preconstruction activities, such as planning, environmental studies, land and rights, and design and specifications, will be performed on Craig-Bonanza 345-kV Transmission Line, Hayden-Archer 345-kV uprate, and Diamond Fork Transmission Line.			
Substations	Continuing		$ 1,211,000
- Construction activities will be completed on Flaming Gorge Switchyard and additions to the Thermopolis Substations. Effort will continue on various substation transformer and security additions.			
Other	Continuing		$ 756,000
- Construction will continue on other minor additions to existing facilities.			
		Total	$19,748,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 5
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Colorado River Storage Power System (continued)

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

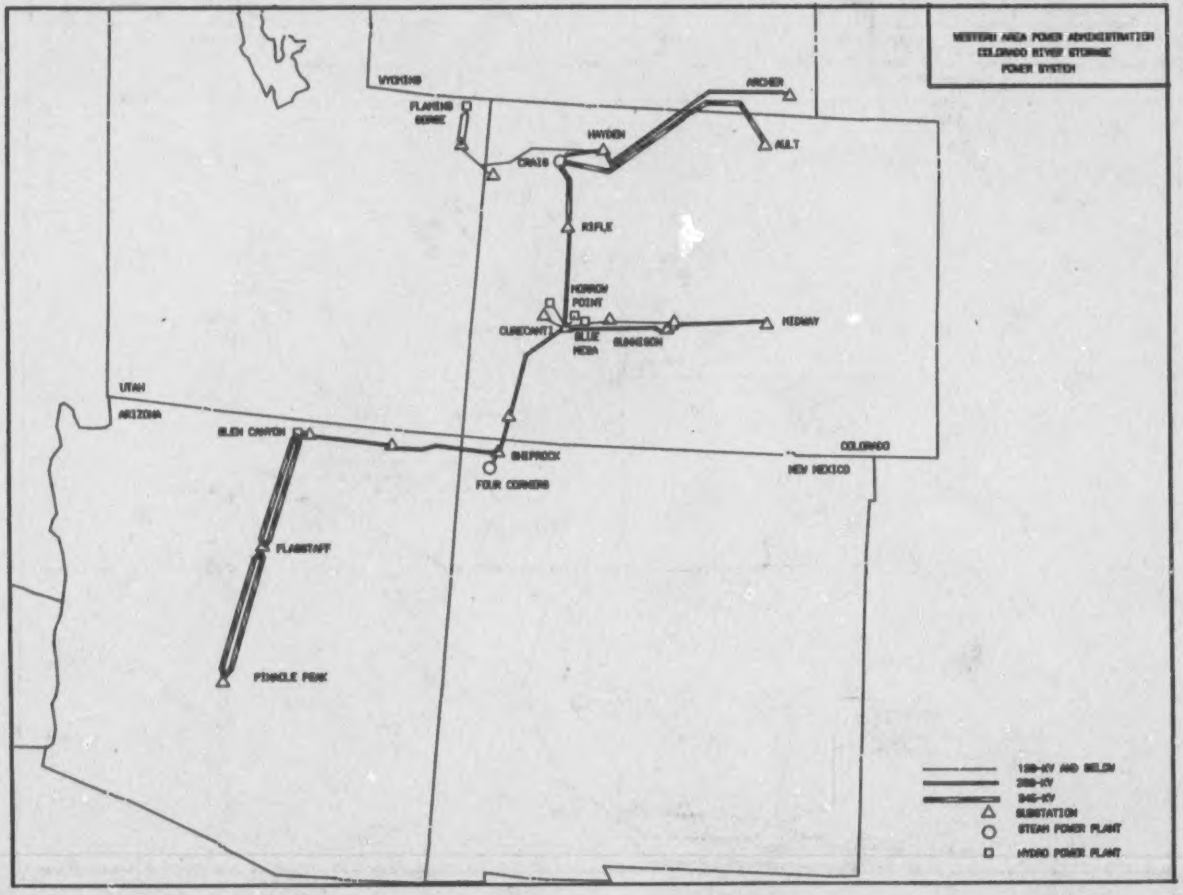
- Completed construction additions to the Archer, Ault, Hayden, and Rifle Substations.

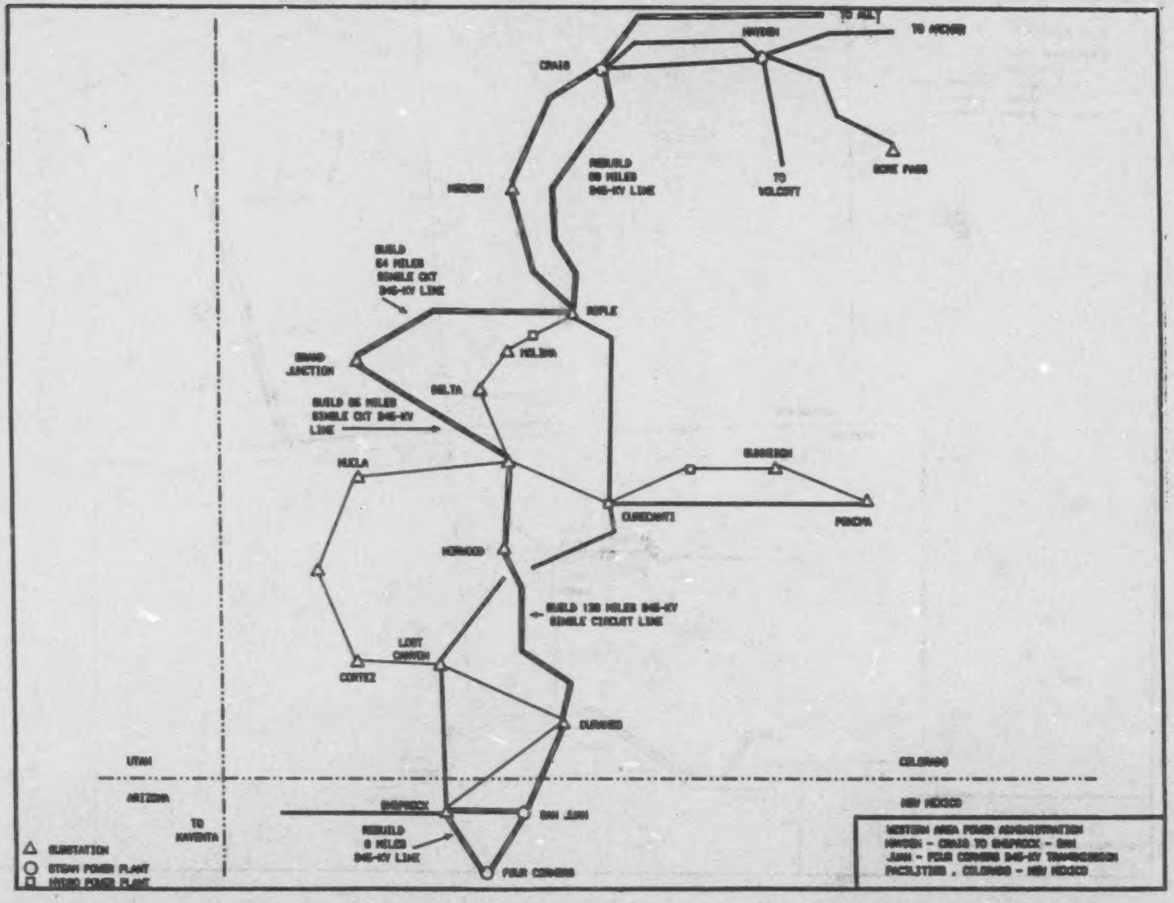
- Construction was completed on Craig Switchyard, Lost Canyon Interconnection, and the Vernal Substation Stage 02.

D. Current Year Planned Achievements

- Complete construction on the Shiprock-Four Corners Transmission Line uprate.

- Complete construction on the Montrose Field Engineering office and laboratory and shop building.


WESTERN AREA POWER ADMINISTRATION
COLORADO RIVER STORAGE
POWER SYSTEM
WYOMING
FLAMING GORGE
ARCHER
HAYDEN
CRAIG
AULT
RIFLE
MORROW POINT
CURECANTI
BLUE MESA
GUNNISON
MIDWAY
UTAH
ARIZONA
GLEN CANYON
SHIPROCK
FOUR CORNERS
COLORADO
NEW MEXICO
FLAGSTAFF
PINNACLE PEAK
138-KV AND BELOW
230-KV
345-KV
SUBSTATION
STEAM POWER PLANT
HYDRO POWER PLANT


TO AULT
TO ARCHER
HAYDEN
CRAIG
REBUILD
88 MILES
345-KV LINE
MEEKER
TO
WOLCOTT
GORE PASS
BUILD
64 MILES
SINGLE CKT
345-KV LINE
RIFLE
MOLINA
GRAND
JUNCTION
DELTA
BUILD 86 MILES
SINGLE CKT 345-KV
LINE
NUCLA
GUNNISON
CURECANTI
PONCHA
NORWOOD
BUILD 138 MILES 345-KV
SINGLE CIRCUIT LINE
LOST
CANYON
CORTEZ
DURANGO
UTAH
COLORADO
ARIZONA
NEW MEXICO
SHIPROCK
SAN JUAN
TO
KAYENTA
REBUILD
8 MILES
345-KV LINE
FOUR CORNERS
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

WESTERN AREA POWER ADMINISTRATION
HAYDEN - CRAIG TO SHIPROCK - SAN
JUAN - FOUR CORNERS 345-KV TRANSMISSION
FACILITIES, COLORADO - NEW MEXICO

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pacific Northwest-Pacific Southwest Intertie

	Estimated Total	Cumulative Prior Years	FY 1983 Estimate		FY 1984 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$489,098	$ 4,850	$ 800	$ 680	$ 2,758	$ 2,464	$480,690
Total DOE obs/BO	$489,098	$ 4,850	$ 800	$ 680	$ 2,758	$ 2,464	$480,690
Non-DOE obs/BO							
Design and Construction	$ 4,281	$ 59	$ 421	$ 358	$ 400	$ 403	$ 3,400
Total Obligations/Outlays	$493,379	$ 4,909	$ 1,221	$ 1,038	$ 3,158	$ 2,867	$484,090
Method of Financing:							
Appropriations Available and Required			$ 608		$ 2,758		$480,690
Application of Prior Year Funds			192		---		---
Non-Federal Advances			421		400		3,400

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 2
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justifications

This power system, authorized by Congress under Public Law 88-552, presently consists of a ±750-kV DC line from the Celilo Converter Station near The Dalles, Oregon to the Sylmar Converter Station near Los Angeles, California, two 500-kV AC lines from north central Oregon thru Northern California to Southern California, and a 345-kV AC line from Mead Substation near Las Vegas, Nevada to Liberty Substation near Phoenix, Arizona.

A second ±750-kV DC line from the Celilo Converter Station to Mead Substation and a 345-kV AC line from Mead Substation to the Phoenix area, although approved, were not constructed.

That portion of the Intertie located in parts of Arizona, California, and Nevada is assigned to the Western Area Power Administration. The portion located in Oregon is assigned to the Bonneville Power Administration. The Intertie permits the sale of power from the Northwest to California, Arizona, and Nevada, and allows seasonal exchanges of capacity between the Pacific Southwest and the Pacific Northwest.

With present generation and load patterns, the existing transmission system does not have the capacity needed to meet Western's customer's requests for transmission service. Western will work with non-Federal power utility interests to study the costs and benefits of an additional line from Mead Substation to the Phoenix area, some 240 miles. This is referred to as Phase I of the continuing project. Study activities for Phase II, the Celilo-Mead portion, will also continue.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justifications (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Transmission Lines and Terminal Facilities - Western will continue planning and initial land and rights activities on the Pacific Northwest-Pacific Southwest DC Intertie, both Phase I and Phase II.	Continuing		$2,758,000
		Total	$2,758,000

B. Management and Contracting

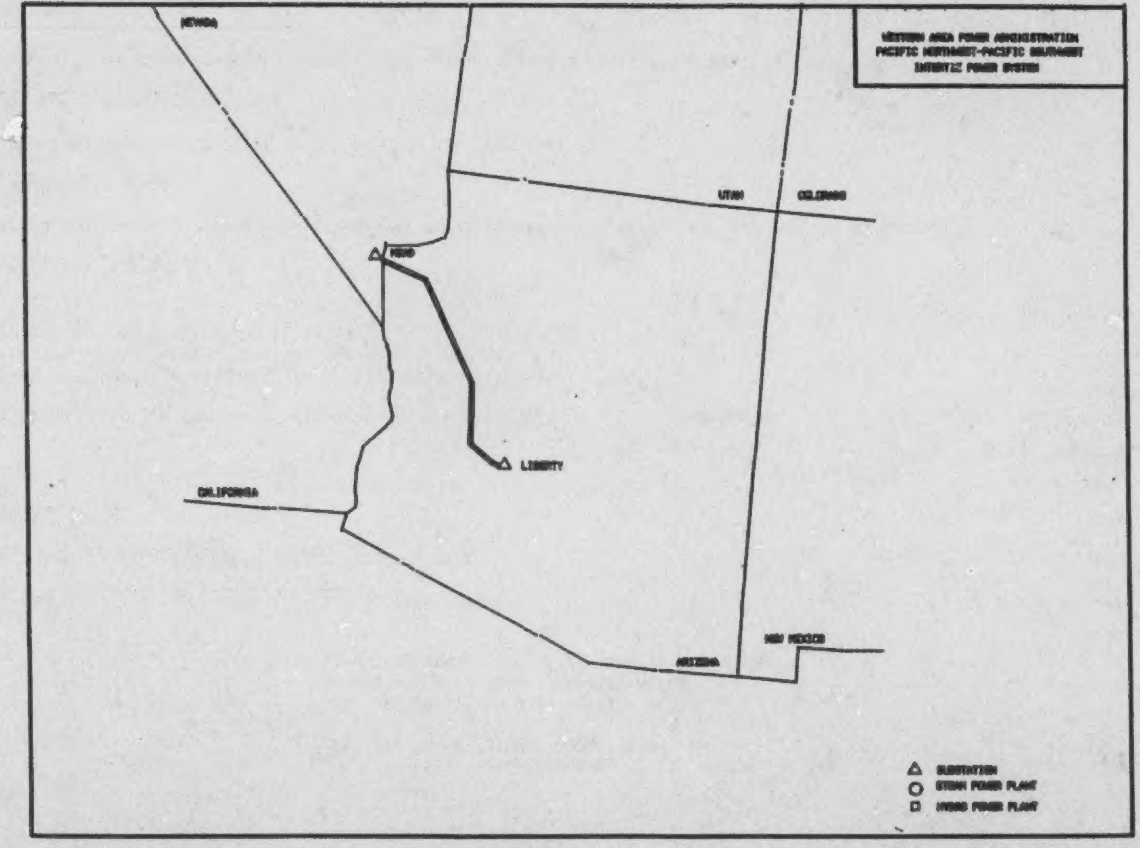
- Planning and land and rights activities will be performed by Western staff and outside contract.

C. Prior Year Achievement

- Western completed construction on the Mead Maintenance Facility.

D. Current Year Planned Achievements

- Western will continue planning studies for Pacific Northwest-Pacific Southwest DC Intertie.


WESTERN AREA POWER ADMINISTRATION
PACIFIC NORTHWEST-PACIFIC SOUTHWEST
INTERTIE POWER SYSTEM
NEVADA
UTAH
COLORADO
MEAD
LIBERTY
CALIFORNIA
NEW MEXICO
ARIZONA
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Parker-Davis Power System

	Estimated Total	Cumulative Prior Years	FY 1983 Estimate		FY 1984 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$ 69,663	$ 6,946	$ 4,610	$ 4,959	$ 8,331	$ 7,773	$ 49,776
Total DOE obs/BO	$ 69,663	$ 6,946	$ 4,610	$ 4,959	$ 8,331	$ 7,773	$ 49,776
Non-DOE obs							
Design and Construction	---	---	---	---	---	---	---
Total Obligations/Outlays	$ 69,663	$ 6,946	$ 4,610	$ 4,959	$ 8,331	$ 7,773	$ 49,776
Method of Financing:							
Appropriations Available and Required			$ 4,576		$ 8,331		$ 49,776
Application of Prior Year Funds			34		---		---
Non-Federal Advances			---		---		---

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 2
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Parker-Davis Power System (continued)

Description, Objectives, and Justifications

The Parker-Davis Power System contains over 1,600 miles of transmission lines and over 2,000,000 kVA of installed capacity at substations in Arizona, California, and Nevada. The facilities are constructed to carry power generated by the Bureau of Reclamation hydroelectric plants at Davis Dam and Parker Dam to various load centers of preference customers.

The construction activities funded by this program consist of additions and modifications to the existing transmission system to increase system dependability and to provide reliable electric service to Western's customers.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Liberty-Coolidge 230-kV Transmission Line and Terminal Facilities	2nd Qtr 1984	3rd Qtr 1986	$1,145,000

- On the present 115-kV Liberty Coolidge Transmission Line, 42 percent of the wood-pole structures need to be replaced because of age, damage, and dry rot. Upgrading of this line will reduce annual maintenance and increase transfer capability to meet projected loads in the Central Arizona Project in Southern Arizona by 1986. In addition, the upgrade will increase the potential for increased revenues from the wheeling of power and will result in an increase in benefits of $1,000,000 annually. An environmental Record of Decision is expected to be filed in FY 1984 which will

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Parker-Davis Power System (continued)

Liberty-Coolidge 230-kV Transmission Line and Terminal Facilities (continued)	Construction Start	Construction Stop	FY 1984 Estimate
permit land acquisition, design, and other construction activities to proceed for the Liberty-Coolidge 230-kV Transmission Line and terminal facilities. The new line will, in part, replace the existing Phoenix-Coolidge 115-kV Transmission Line.			
Coolidge-Saguaro 115-kV Transmission Line Upgrade	3rd Qtr 1983	2nd Qtr 1984	$3,545,000
- Western will complete the reconductoring of approximately 30 miles of 115-kV transmission line to meet present and future loads.			
Transmission Lines and Terminal Facilities	Continuing		$ 153,000
- Western will perform various planning and design activities on miscellaneous facilities, including Tucson-Apache 115-kV Transmission Line upgrade.			
Substations			
- Western will complete construction of the Parker 69-kV Switchyard modifications and will perform various planning and design activities on other substation facilities.	Continuing		$1,553,000

POWER SYSTEM DATA SHEET - 4
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Parker-Davis Power System (continued)

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Other			
- Western will continue planning, design, and other preconstruction activities on miscellaneous facilities and minor modifications to substantially completed facilities.	Continuing		$1,935,000
		Total	$8,331,000

B. Management and Contracting

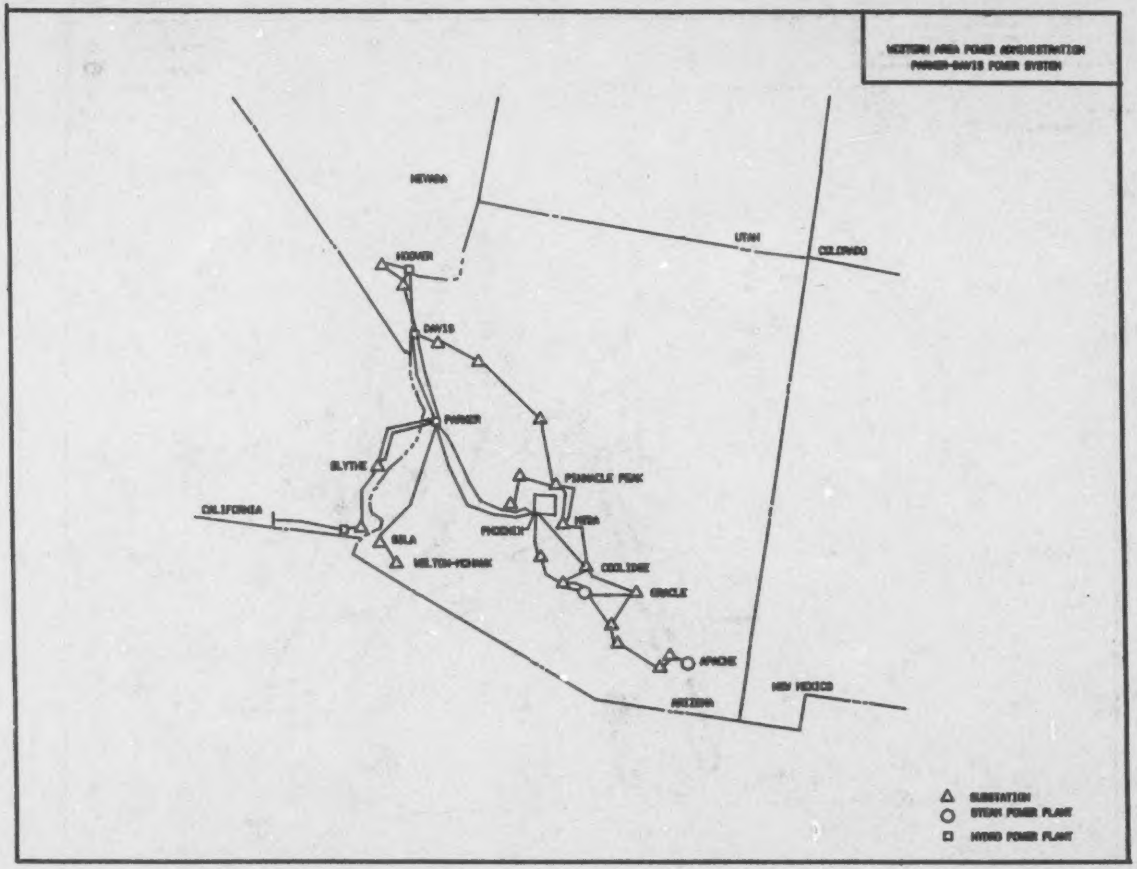
- Design and other preconstruction work will be performed by Western staff and outside contract as required. Construction will be performed by contractor effort.

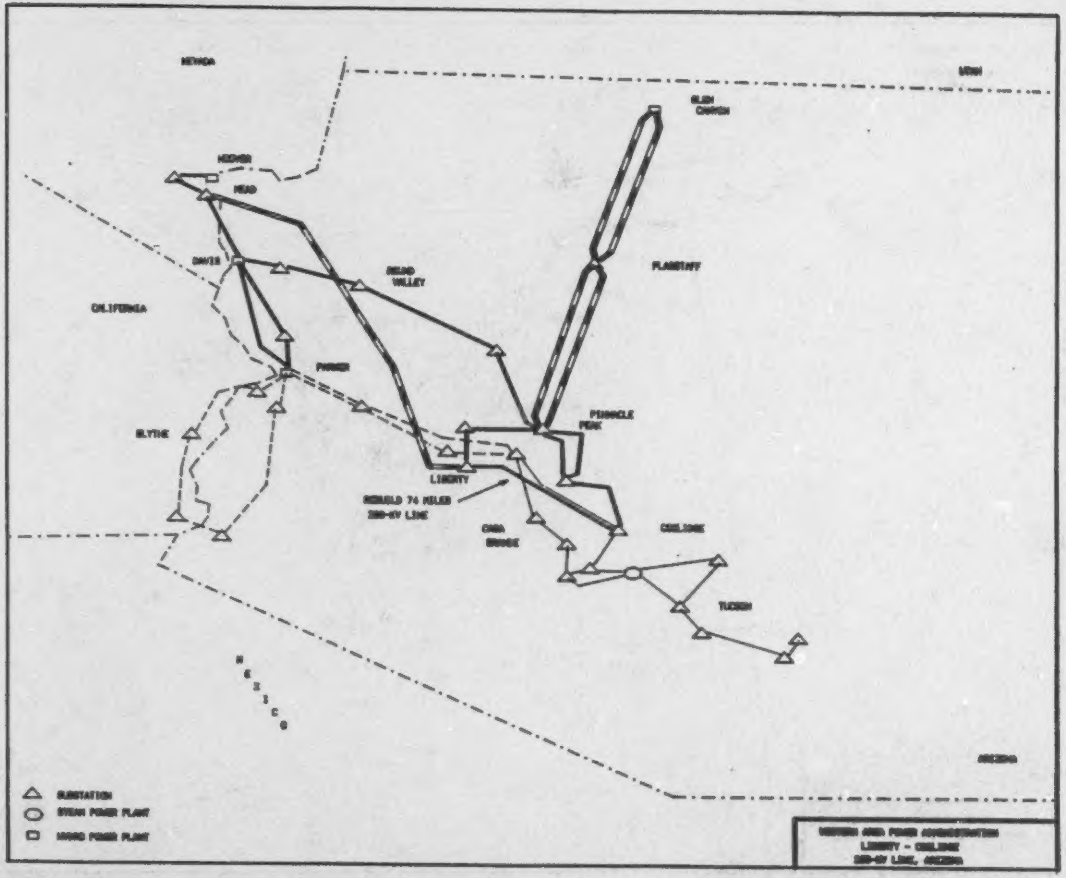
C. Prior Year Achievements

- Western completed Phase III of the wood-pole replacement program.

D. Current Year Planned Achievements

- Western will complete designs and specifications for Coolidge-Saquaro 115-kV Transmission Line upgrade and Parker 69-kV Switchyard, and will continue environmental activity for Liberty-Coolidge 230-kV Transmission Line and terminal facilities.


WESTERN AREA POWER ADMINISTRATION
PARKER-DAVIS POWER SYSTEM
NEVADA
UTAH
COLORADO
HOOVER
DAVIS
PARKER
BLYTHE
CALIFORNIA
GILA
WELTON-MOHAWK
PHOENIX
PINNACLE PEAK
MESA
COOLIDGE
ORACLE
APACHE
NEW MEXICO
ARIZONA
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT


NEVADA
UTAH
GLEN CANYON
HOOVER
MEAD
DAVIS
[illegible] VALLEY
FLAGSTAFF
CALIFORNIA
PARKER
BLYTHE
PINNACLE PEAK
LIBERTY
REBUILD 74 MILES 230-KV LINE
CASA GRANDE
COOLIDGE
TUCSON
MEXICO
ARIZONA
SUBSTATION
STEAM POWER PLANT
HYDRO POWER PLANT

WESTERN AREA POWER ADMINISTRATION
LIBERTY - COOLIDGE
230-KV LINE, ARIZONA

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET

Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System

	Estimated Total	Cumulative Prior Years	FY 1983 Estimate		FY 1984 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$425,468	$ 94,655	$ 36,600	$ 31,110	$ 38,814	$ 38,482	$255,399
Total DOE obs/BO	$425,468	$ 94,655	$ 36,600	$ 31,110	$ 38,814	$ 38,482	$255,399
Non-DOE obs/BO							
Design and Construction	$ 53,561	$ 9,682	$ 8,685	$ 7,382	$ 10,571	$ 10,288	$ 24,623
Total Obligations/Outlays	$479,029	$104,337	$ 45,285	$ 38,492	$ 49,385	$ 48,770	$280,022
Method of Financing:							
Appropriations Available and Required			$ 36,518		$ 38,814		$255,399
Application of Prior Year Funds			82		---		---
Non-Federal Advances			8,685		10,571		24,623

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 2
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System (continued)

Description, Objective, and Justification

The transmission facilities of the Pick-Sloan Missouri Basin Program interconnect Federal hydroelectric powerplants in Western's operational area and deliver power for irrigation pumping and sales to municipalities, cooperatives, private utilities, and wholesale customers of Western. This major power marketing system is operated by two Western Area Offices; the Loveland Area Office for portions of this program in Wyoming, Colorado, and Nebraska; and the Billings Area Office for portions within North Dakota, South Dakota, Iowa, Minnesota, Missouri, Montana, and Nebraska. Western will continue to construct new facilities and upgrade existing transmission facilities to increase system dependability and to assure reliable electric service for Western's customers.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Great Falls-Conrad 115-kV Transmission Line and Terminal Facilities	4th Qtr 1984	1st Qtr 1986	$2,498,000

- Construction of the Great Falls-Conrad Transmission Line is proposed to provide additional transmission capacity to the load centers in the Conrad, Montana area. The proposed 90-mile line is planned to run from Great Falls west to the Chateau/Fairfield area where an intermediate substation will be constructed. From this area, the line will run north to Conrad, where it will be interconnected with the existing transmission loop at the Conrad 115-kV Substation. After the completion of the Great Falls-Conrad line, the long-range planning for the area calls for eventual construction of a new line from Conrad to Browning, Cut Bank, or Shelby, to support the loads in the Glacier Electric area and further strengthen the transmission loop.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System (continued)

Activity	Construction Start	Construction Stop	FY 1984 Estimate
White-Brookings 115-kV Transmission Line and Terminal Facilities	Apr 1982	4th Qtr 1985	$3,315,000

- Western will complete construction of the White-Brookings Transmission Line and Brookings Substation additions in the winter of 1983. This line will provide temporary 115-kV service to local area loads in the Ivanhoe, Minnesota area thereby avoiding costly duplicate construction by East River Electric Power Cooperative. White Substation, which will be under construction in FY 1984, will be a new 345/115-kV switching station that will provide termination and transformation facilities to interconnect Western's existing Watertown-Sioux City 345-kV Transmission Line with Western's existing 115-kV system in the Brookings/Flandreau area of South Dakota. This will be accomplished by terminating the White-Brookings 115-kV Transmission Line in White Substation. It will also serve as a new delivery point to provide permanent 115-kV service to the Ivanhoe, Minnesota area. White Substation will include provisions for two 345-kV line bays, three 345-kV circuit breakers, one 345/115-kV autotransformer, three 115-kV circuit breakers, two 115-kV line bays, and associated switchyard facilities such as bus work, control house, and fencing.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 4
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System (continued)

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Billings Microwave System - This system will consist of about 82 microwave repeaters and base stations, extending from Havre, Montana, to Sioux City, Iowa, where it will interface with the future Corps of Engineers' microwave system to Omaha. The system will have a capacity of 300-400 channels and will handle some of the Corps of Engineers communication requirements for control of their powerplants on the Missouri River. The system will be used to handle all of Western's communications and control requirements in the Billings Area. The requirements include, but are not limited to voice, protective relaying, telemetering, VHF radio, supervisory control and data acquisition, and energy control systems circuits.	4th Qtr 1984	4th Qtr 1986	$2,050,000
A.c.-d.c.-a.c. Ties - The activity provides for acquisition and installation of 200 MW, a.c.-d.c.-a.c. tie at Miles City, Montana and a construction of related facilities. In the late 1960's and early 1970's, the eastern and western United States transmission systems were synchronized and operated interconnected through closure of the east/west ties at Fort Peck and Yellowtail in eastern Montana, and Stegall in Western Nebraska. The interconnecting transmission lines consisting of a 161-kV line at Fort Peck and single	Aug 1982	4th Qtr 1987	$12,293,000

Pick-Sloan Missouri Basin Power System (continued)

A.c.-d.c.-a.c. Ties (continued)	Construction Start	Construction Stop	FY 1984 Estimate

230-kV lines at Yellowtail and Stegall did not provide sufficient transmission capacity to maintain integrated operations due to large unscheduled flows between the two large generating masses. Unscheduled flow for system changes in either area stress the relatively weak east/west ties, requiring separation. Severe voltage excursions on the systems adjacent to the separation points became intolerable and eventually resulted in abandonment of interconnected a.c. operations. This operation resulted in Western being the only major electrical system in the United States with substantial amounts of transmission on both sides of the east/west separation. The inability to transfer large blocks of power across Western's system has reduced the efficiency of the Federal system operations.

The construction contract for the Miles City Converter Station was awarded in August 1982. The FY 1984 funding request provides for continued contractor earnings on Miles City Converter Station. The request also provides for continuation of Miles City Substation No. 3, and Crossover Substation.

POWER SYSTEM DATA SHEET - 6
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System (continued)

Activity	Construction		FY 1984
	Start	Stop	Estimate
Transmission Lines and Terminal Facilities	Continuing		$6,508,000
- Western will complete construction of Holyoke-Wauneta 115-kV Transmission Line and terminal facilities and Flatiron-Big Thompson 13.8-kV Transmission Line in Colorado. Western will perform preconstruction activities, such as planning, environmental studies, land and rights, and designs and specifications for Thermopolis. Alcova 230-kV Transmission Line and Terminal Facilities, Gering-Archer 115-kV Transmission Line, Casper-Seminoe 230-kV Transmission Line, and other miscellaneous facilities. Western will begin construction on the upgrade of Fleming and Haxtun Taps and Sterling Substation.			
Substations	Continuing		$6,299,000
- Western will complete autotransformer and power circuit breaker installations at Fort Thompson (South Dakota), Huron (South Dakota), Thermopolis (Wyoming), and Dawson County (Montana) substations. Western will complete installation of a static var generator at Fargo Substation to replace existing synchronous condensers. Western will continue to purchase and install minor system-wide additions such as autotransformers, power circuit breakers, station security additions, sectionalizing switches and protective relays for miscellaneous facilities. Preconstruction activities, such as planning and designs and specifications, will be performed on various facilities, including Jamestown			

POWER SYSTEM DATA SHEET - 7

Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System (continued)

Activity	Construction Start	Construction Stop	FY 1984 Estimate
Substation (North Dakota), Maurine Substation (South Dakota), and Gayville Tap Substation (South Dakota). Construction work will begin on installation of a capacitor bank at Valley City Substation (North Dakota).			
Other	Continuing		$5,851,000
- Western will continue to purchase and install miscellaneous system additions, such as microwave equipment, telecommunications, and supervisory control equipment for substantially completed facilities. Preconstruction activities will be performed for various facilities, including the Bismarck Service Center. Construction will begin on warehouse facilities near Loveland, Colorado; an operations office in Watertown; and a materials testing laboratory in Huron.			
		Total	$38,814,000

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contract as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

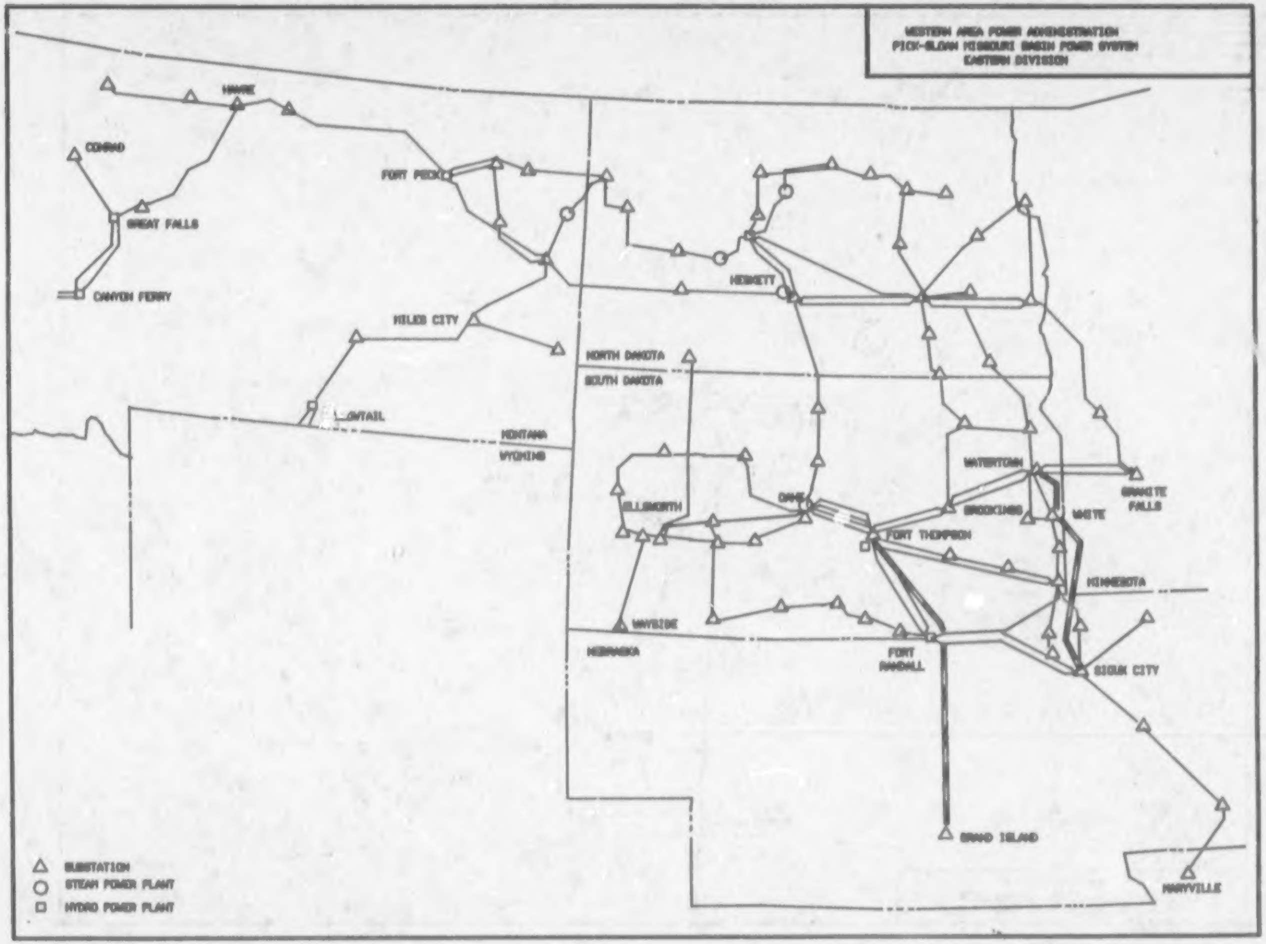
- Completed construction of Fort Thompson Substation Stage 06, Lovell Substation, and Miles City-New Underwood 230-kV Transmission Line and terminal facilities.

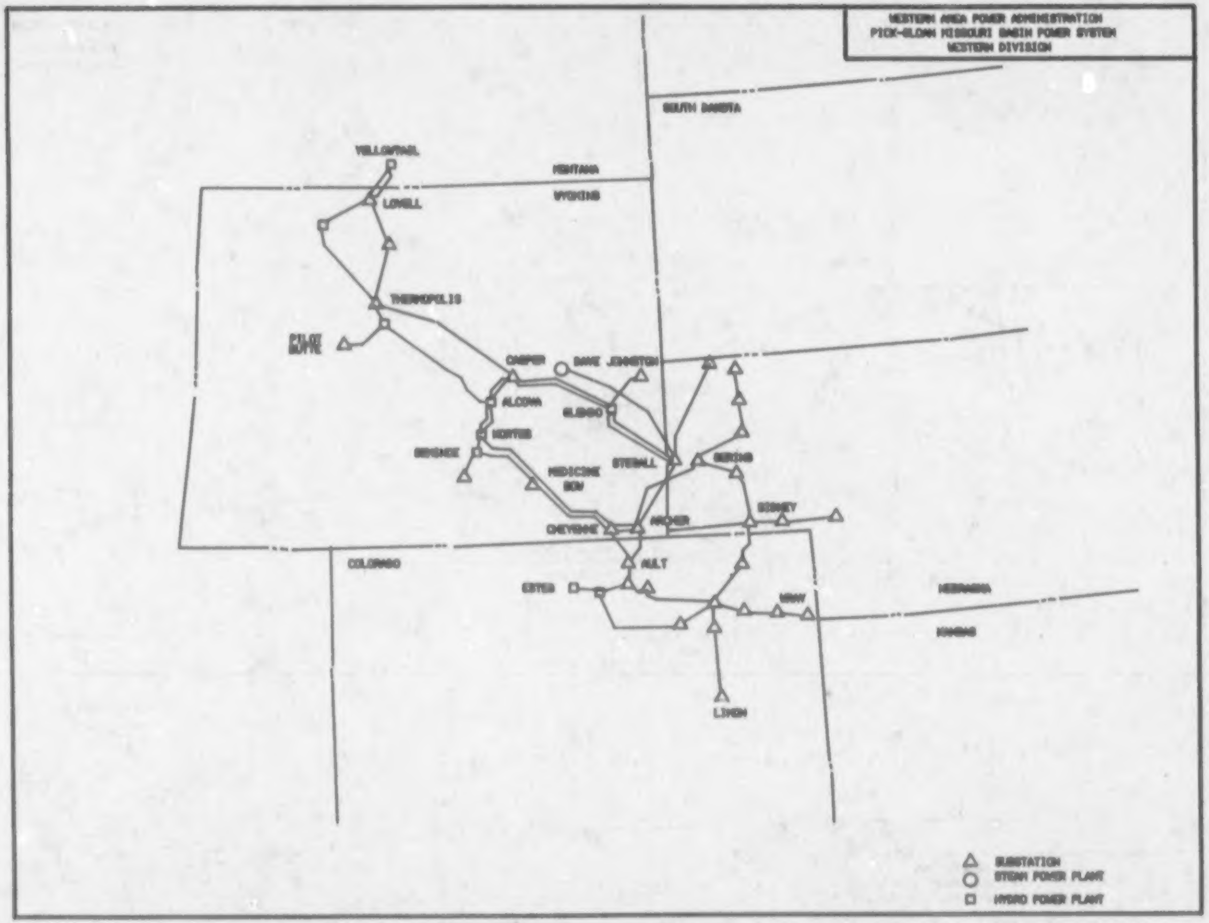
POWER SYSTEM DATA SHEET - 8
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

Pick-Sloan Missouri Basin Power System (continued)

D. Current Year Planned Achievements

- Complete construction of White-Brookings 230-kV Transmission Line, Beaver Creek-Weld 115-kV Transmission Line, Sterling-Holyoke 69-kV Transmission Line, Limestone Substation, Pilot Butte Substation, and Poudre Substation.


WESTERN AREA POWER ADMINISTRATION
PICK-SLOAN MISSOURI BASIN POWER SYSTEM
EASTERN DIVISION
HAVRE
CONRAD
GREAT FALLS
CANYON FERRY
FORT PECK
HESKETT
MILES CITY
NORTH DAKOTA
SOUTH DAKOTA
YELLOWTAIL
MONTANA
WYOMING
ELLSWORTH
OAHE
FORT THOMPSON
WATERTOWN
BROOKINGS
WHITE
GRANITE FALLS
MINNESOTA
WAYSIDE
NEBRASKA
FORT RANDALL
SIOUX CITY
GRAND ISLAND
MARYVILLE
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT


WESTERN AREA POWER ADMINISTRATION
PICK-SLOAN MISSOURI BASIN POWER SYSTEM
WESTERN DIVISION
SOUTH DAKOTA
YELLOWTAIL
MONTANA
WYOMING
LOVELL
THERMOPOLIS
PILOT BUTTE
CASPER
DAVE JOHNSTON
ALCOVA
GLENDO
KORTES
SEMINOE
MEDICINE BOW
STEGALL
GERING
SIDNEY
CHEYENNE
ARCHER
COLORADO
AULT
ESTES
WRAY
NEBRASKA
KANSAS
LIMON
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

OPERATION AND MAINTENANCE
GENERAL STATEMENT

Summarized Financial Data

Fiscal Year 1983	
Appropriation	$52,800,000
Application of Prior Year Funds	5,400,000
Total FY 1983	$58,200,000
Fiscal Year 1984	
Estimate of Appropriation	$72,863,000
Total FY 1984	$72,863,000

Western performs Federal electric power marketing and transmission functions in 15 central and western states encompassing a 1.3-million-square-mile area. In terms of the 8,321 megawatts (MW) of generating capacity it sells, Western is the third largest utility operation in the interconnected power system in the 15-state area.

Western sells power to over 460 customers consisting of cooperatives, municipalities, public utility districts, private utilities, Federal and state agencies, and irrigation districts. The wholesale power customers, in turn, provide service to millions of retail consumers. Western is also responsible for the operation and maintenance of about 16,000 miles (13,000 miles under this appropriation funded activity) of high-voltage transmission lines, approximately 200 substations, and for construction, rehabilitation, and operation and maintenance of additional Federal transmission facilities that may be authorized in the future. Electric power marketed by Western is generated at 47 hydropower plants which are operated by the Bureau of Reclamation (BuRec), the Corps of Engineers (COE), and the International Boundary and Water Commission (IBWC). Additionally, Western markets the United States' entitlement from the large Navajo coal-fired plant near Page, Arizona.

Western's power marketing function evolved over a period of years as BuRec, COE, and IBWC multipurpose water development projects were authorized. These projects include irrigation, flood control, and power facilities. Each project is administered as an independent entity in terms of authorizing legislation, repaying the reimbursable portion of project investment, and in establishing power rates.

Western's power marketing revenues for each project must be sufficient to meet the cost of operation and maintenance of associated transmission and generation facilities, including purchase power and replacement cost, and to repay with interest the investment in Western's power facilities along with those of the associated Federal generating facilities. In addition, power revenues must help repay the investment in associated Federal irrigation facilities that is beyond the water users' ability for repayment.

Accomplishments:

- Energy sales, related to this activity, are 25.7 million megawatthours in FY 1982 and 26.5 million megawatthours in FY 1983. This will result in power revenues totaling $243,793,000 and $290,435,000, respectively.

- One of the most pressing issues that Western has faced over the past 3 years has been the development of comprehensive marketing plans for projects where existing contracts for Federal power will expire. During FY 1981, Western adopted a marketing plan for the Eastern Division of the Pick-Sloan Missouri Basin program, completed a marketing plan and rate schedules for the Fryingpan-Arkansas Project, and adopted a power marketing plan for the Central Valley Project. Additionally, criteria for marketing power from programs of the Boulder City Area Office have been published and meetings held. Western plans to complete marketing plans for programs in the Boulder City Area and plans for the Western Division of the Pick-Sloan Missouri Basin program during FY 1983.

- Western, since its establishment in 1977, has implemented rate increases for the Central Valley Project, the Rio Grande Project, the Boulder Canyon Project, the Colorado River Storage Project, the Fryingpan-Arkansas Project, the Pick-Sloan Missouri Basin Project and the Parker-Davis Project. Western is currently in the process of completing another rate increase for the Central Valley Project. The rate adjustment action for the Rio Grande Project put this project on sound financial condition for the first time since 1950. This is possible because the cost of power from alternative sources in the area, which previously served as the limit for the rate charged, has now increased sufficiently that this program rate can be raised to repay the Rio Grande Project on schedule.

- In FY 1982 Western implemented the Maintenance Information System at the pilot test site in Sacramento, California. Phase in of Western's Maintenance Information System is planned for completion by late FY 1983. The system is being developed to account for manhours expended against specific equipment and maintenance activities.

- Western published its final Guidelines and Acceptance Criteria in November 1981, requiring firm power customers to develop and implement their own individual energy conservation programs. Western renewed over 200 contracts to date that include specific provisions for customer energy conservation programs.

- Western has maintained about 13,000 miles of transmission lines, over 200 substations and appurtenant facilities annually with minimum system outages. When outages have occurred, service has been restored promptly and efficiently.

Objectives:

- Estimated energy sales for FY 1984 are 28.3 million megawatthours and for the period FY 1985-1988 are 109.9 million megawatthours. Projected power revenues for FY 1984 are $374,393,000 and for the FY 1985-1988 period are $1,825,261,000.

- Based on study analysis, Western expects to initiate rate adjustments on the Pacific Northwest-Pacific Southwest Intertie Project, the Parker-Davis Project, and the Collbran Project. Rate studies will be performed on the Falcon-Amistad and Fryingpan-Arkansas Projects.

- Western will use annual appropriations to continue to operate and maintain 13,000 miles of transmission lines and over 200 substations. Western will increase operational efficiency by installing supervisory control and data acquisition equipment into Western's transmission system; upgrading the telecommunication system used for power system operations; and upgrading and standardizing power system protection equipment such as high-speed relays and circuit breakers.

- Western will continue to plan and implement an effective conservation and renewable energy program incorporating conservation and renewable energy measures in new power marketing contracts and contracts eligible for renewal.

FY 1984 Budget Request:

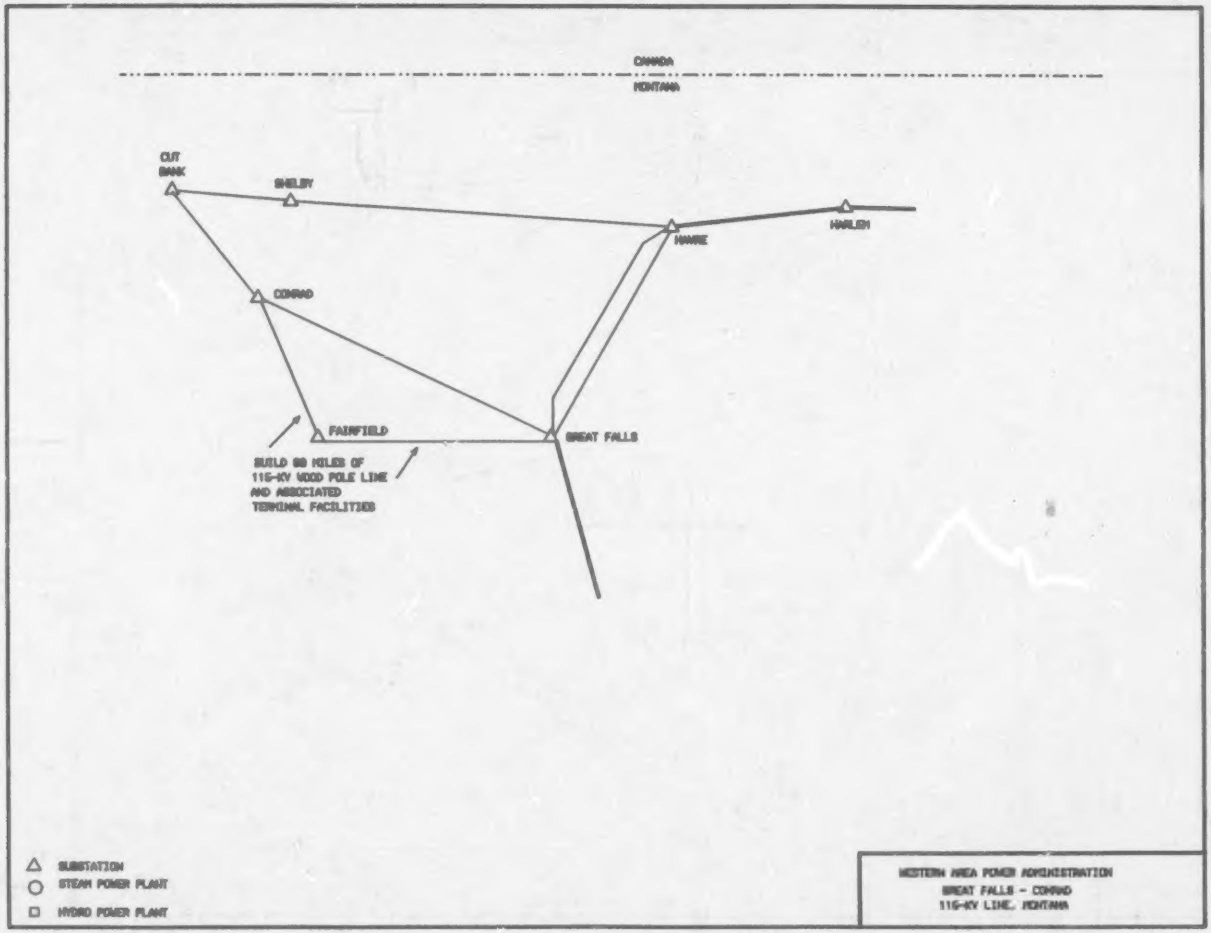
In FY 1984 Western is requesting $72,863,000 for operation and maintenance. These funds will allow Western to continue to operate and maintain 13 power systems, consisting of about 13,000 miles of transmission lines and about 200 switchyards/substations and various associated electrical facilities. Western will market power to over 400 wholesale contract customers. System replacements and additions for communications, system control, and operations will be provided to keep the power systems operable and to improve effectiveness and efficiency of operations. The request also provides for dispatching and marketing of power. Western will continue its conservation and renewable energy program encouraging and assisting wholesale customers to develop their own programs.

Western is also continuing to operate and maintain transmission facilities of the Colorado River Basin Salinity Control Project and the Colorado River Front Work and Levee System. Costs associated with operation and maintenance of these projects are nonreimbursable in accordance with authorizing legislation.

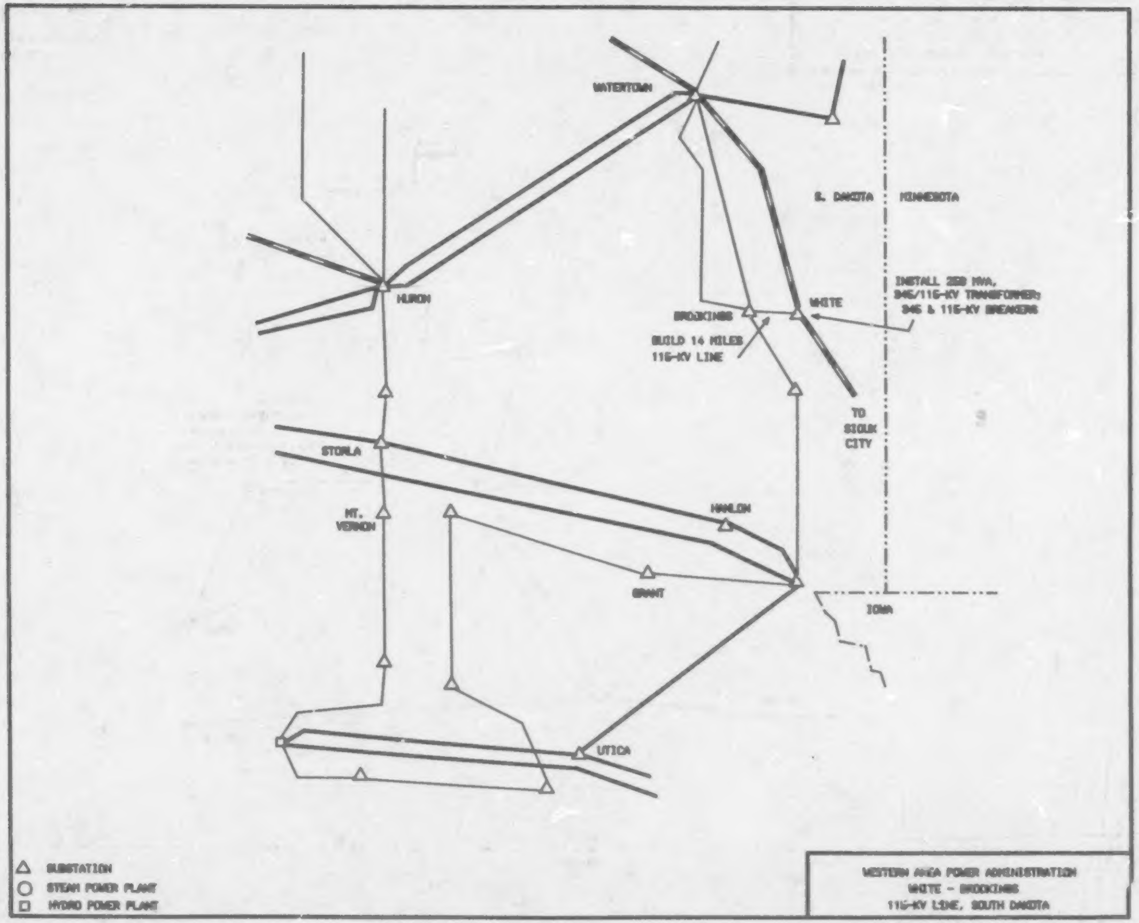
The following pages include a table which compares the FY 1983 and FY 1984 programs and narrative justification statements by major program categories.

SYSTEM OPERATION AND MAINTENANCE
SUMMARY OF CHANGES IN APPROPRIATION REQUIREMENT FROM FY 1983 TO FY 1984
(In thousands of dollars)

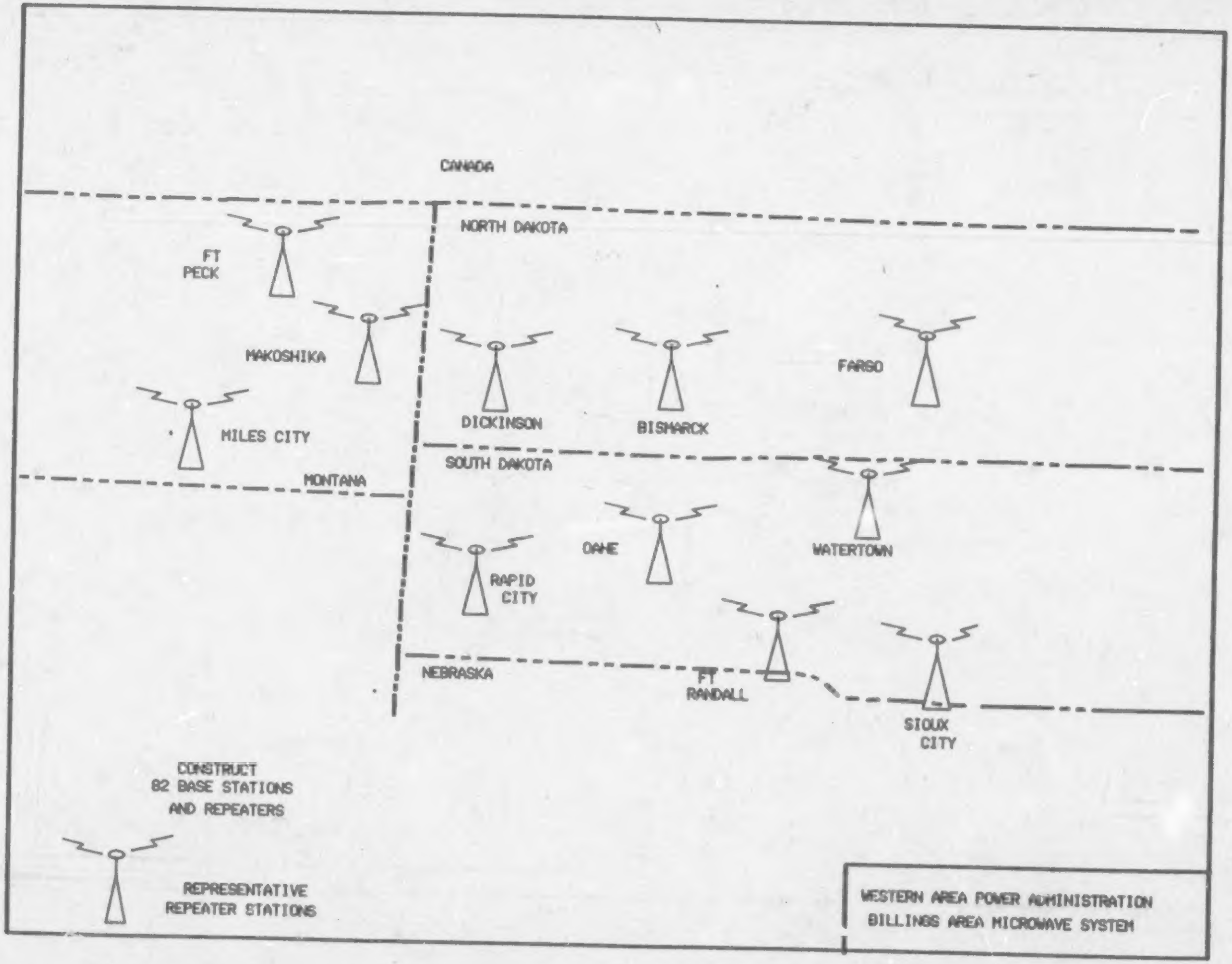
Program Category	Fiscal Year 1983	Estimated Fiscal Year 1984	Increase (+) or Decrease (-)
Transmission System:			
Operation and Maintenance of Transmission Lines	$10,245	$13,839	$+ 3,594
Operation and Maintenance of Substations	9,945	13,532	+ 3,587
Operation and Maintenance of Communications Systems	2,208	3,616	+ 1,408
Subtotal - Transmission System	$22,398	$30,987	$+ 8,589
System Operation:			
Dispatching	$ 3,750	$ 4,625	$+ 875
Power Marketing	2,962	3,395	+ 433
Power Billing and Collecting ...	907	1,281	+ 374
Subtotal - System Operation ..	$ 7,619	$ 9,301	$+ 1,682
Energy Conservation and Renewable Resources Program	$ 885	$ 659	$- 226
Administrative and General Expense	12,852	19,751	+ 6,899
Replacements and Additions	9,046	12,165	+ 3,119
Total	$52,800	$72,863	$+20,063


CANADA
MONTANA
CUT BANK
SHELBY
HAVRE
HARLEM
CONRAD
FAIRFIELD
GREAT FALLS
BUILD 80 MILES OF 115-KV WOOD POLE LINE AND ASSOCIATED TERMINAL FACILITIES
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

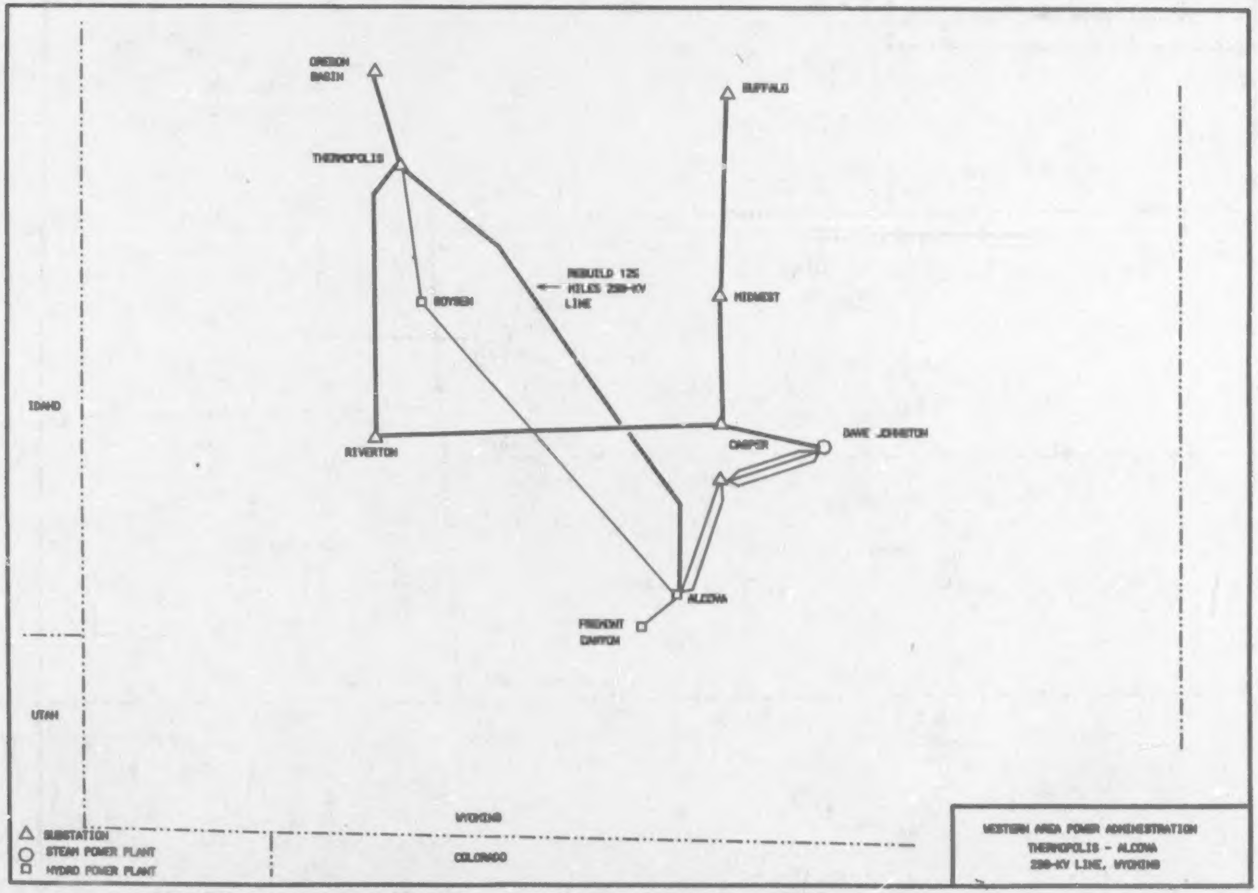
WESTERN AREA POWER ADMINISTRATION
GREAT FALLS - CONRAD
115-KV LINE, MONTANA


WATERTOWN
S. DAKOTA
MINNESOTA
HURON
BROOKINGS
WHITE
INSTALL 230 MVA,
345/115-KV TRANSFORMER;
345 & 115-KV BREAKERS
BUILD 14 MILES
115-KV LINE
TO
SIOUX
CITY
STORLA
MT.
VERNON
HANLON
GRANT
IOWA
UTICA
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

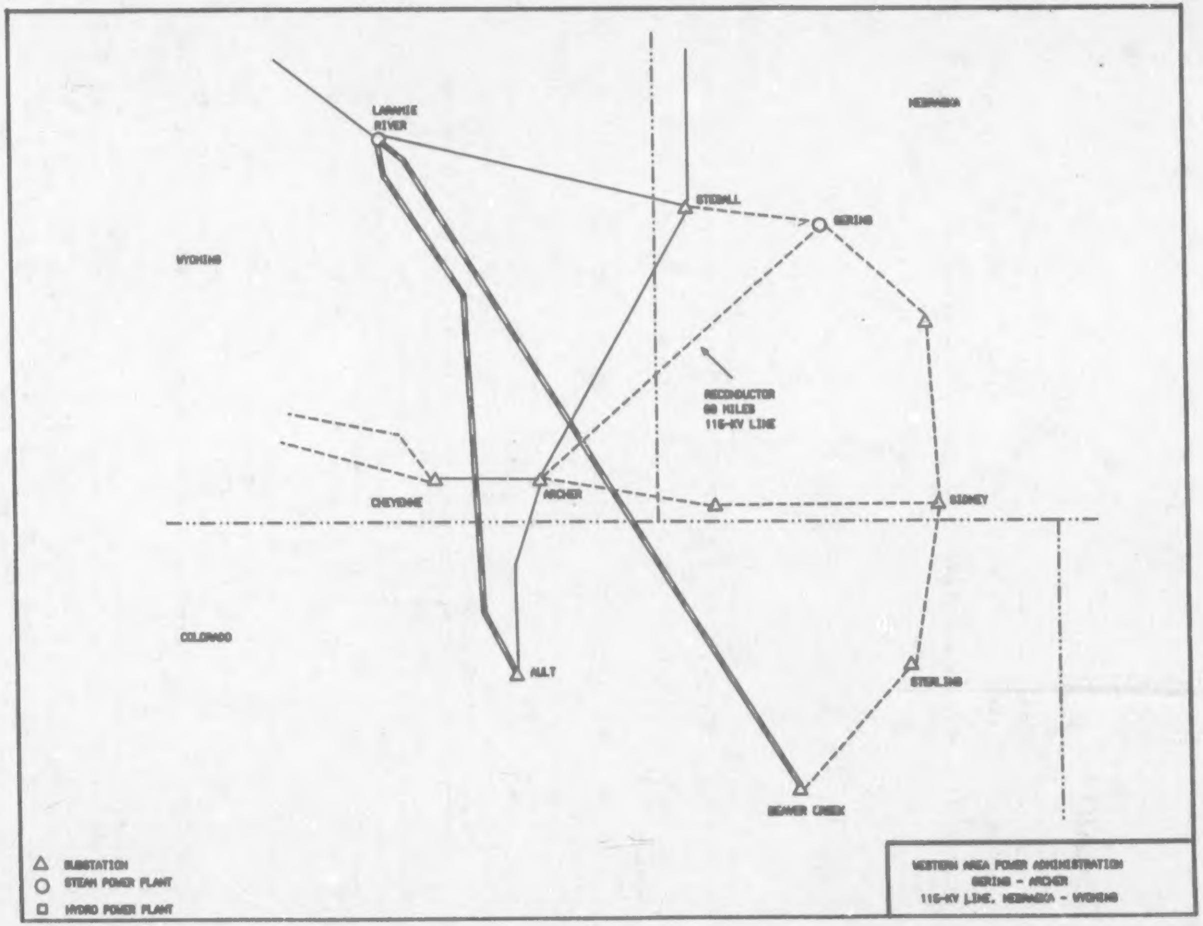
WESTERN AREA POWER ADMINISTRATION
WHITE - BROOKINGS
115-KV LINE, SOUTH DAKOTA


CANADA
NORTH DAKOTA
FT PECK
MAKOSHIKA
MILES CITY
MONTANA
DICKINSON
BISMARCK
FARGO
SOUTH DAKOTA
RAPID CITY
OAHE
WATERTOWN
NEBRASKA
FT RANDALL
SIOUX CITY
CONSTRUCT 82 BASE STATIONS AND REPEATERS
REPRESENTATIVE REPEATER STATIONS

WESTERN AREA POWER ADMINISTRATION
BILLINGS AREA MICROWAVE SYSTEM


OREGON BASIN
BUFFALO
THERMOPOLIS
REBUILD 125 MILES 230-KV LINE
BOYSEN
MIDWEST
IDAHO
RIVERTON
CASPER
DAVE JOHNSTON
ALCOVA
FREMONT CANYON
UTAH
WYOMING
COLORADO
△ SUBSTATION
○ STEAM POWER PLANT
□ HYDRO POWER PLANT

WESTERN AREA POWER ADMINISTRATION
THERMOPOLIS - ALCOVA
230-KV LINE, WYOMING


LARAMIE RIVER
NEBRASKA
STEGALL
GERING
WYOMING
RECONDUCTOR
60 MILES
115-KV LINE
CHEYENNE
ARCHER
SIDNEY
COLORADO
AULT
STERLING
BEAVER CREEK
SUBSTATION
STEAM POWER PLANT
HYDRO POWER PLANT
WESTERN AREA POWER ADMINISTRATION
GERING - ARCHER
115-KV LINE, NEBRASKA - WYOMING

Narrative Justifications: FY 1984 Request

Transmission System $30,987,000

The request provides for the operation and maintenance of 13,000 miles of transmission lines, over 200 substations and associated switchyards, and communications systems. This request will provide for additional full-time permanent positions and other cost increases for materials, supplies, and associated costs required to facilitate start up, operation, and maintenance of a new AC/DC/AC converter station at Miles City, Montana, and to perform maintenance on facilities transferred from the Bureau of Reclamation, and on newly energized facilities in the Phoenix District.

Operation and maintenance expenses of the transmission system include activities necessary to protect equipment and provide electric service to customers. Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage levels, equipment to regulate voltages, relays for automatic protection, meters, and associated electrical equipment. Operation and maintenance duties performed in substations consist of switching to deenergize lines and equipment during emergencies and maintenance of the electrical equipment. Maintenance of transmission lines consists of ground or aerial line patrols for inspection purposes; the maintenance of structures, insulators, conductors, overhead ground wires; access road maintenance; right-of-way maintenance; weed control; erosion control; and spray treatment of wood poles. Communication systems maintenance includes maintaining microwave equipment, radios, powerline carriers, telemetering, and other power system control equipment.

System Operation ....$ 9,301,000

This request is for power system control and dispatching, power marketing, and power billing and collecting activities.

Dispatching and power system control activities include: central control of the electric operation of the Federal transmission system; operation of the central control and data acquisition computers at Western's power system control centers; modification and maintenance of the operations related computers, computer terminal equipment and computer programs; dispatching of power over the Federal transmission system; and coordination of the operation of the power system with other interconnected power systems.

Power marketing includes forecasting regional power loads and planning resources including hydrologic water forecasting within four major river basins to meet loads. Resource planning involves the study of power capability of both existing and future generating projects, analysis of long-range water storage programs, and coordination of Federal and non-Federal power resources within the Western marketing areas. The study of power loads and resources resulting from interregional transmission connections is also a part of this activity.

Power marketing, power billing, and collecting activities consist of: negotiation and administration of contracts for power sales, wheeling, and other services; the planning, coordination, and review of plans for electric facilities to serve customers; computation of bills for power sales, interchanges, wheeling, and other accounts; the preparation of official data relative to deliveries and transmission of power; and development of Western's power and wheeling rates and revenue studies.

Energy Conservation and Renewable Resources Program ....$ 659,000

As of December 31, 1981, all contracts renegotiated with Western's customers require the customer's initiation of an energy conservation program. The FY 1984 request provides for modifying these customer contracts and for furnishing support services and equipment such as anemometers to measure wind currents as a potential energy resource and thermal infrared scanners to detect structural heat seep.

Administrative and General Expense $19,751,000

This request provides for expenses of executive management; direction of power marketing functional activities related to power supply and scheduling; power resources and requirements studies; general system studies; customer service policy development; environmental analysis coordination; and public involvement activities. Administrative support services include budget, finance, personnel, safety, procurement, supply and office services, audit functions, computer support, legal counseling, and the expenses associated with these activities for the Western Headquarters, Area, and District Office activities.

Replacement and Additions $12,165,000

Replacements and additions are units of property which are required for system operations and reliability. The FY 1984 budget request includes $1,500,000 for the purchase of a fixed-wing aircraft. The replacements and additions which are provided for in the FY 1984 Request are categorized as follows:

Substation equipment ($ 5,089,000).

Included in the total is $759,000 to replace oil circuit breakers at Blythe, Gila, and Wellton Substations and to uprate or replace breakers, switches, and transformers supporting present and future load growth in the southwest. The request also includes $1,809,000 to replace circuit breakers, transformers, bushings, and switches for the Pick-Sloan Missouri Basin program; $244,000 for metering equipment; $294,000 for substation safety features and enhancements; $210,000 to replace relay equipment; and $167,000 to continue the polychlorinated biphenyl replacement programs. The balance of the request will fund circuit breakers, control panels, chargers and batteries, relays, and other electrical equipment throughout the system.

Mobile equipment ($ 3,266,000).

Western has programmed $1,500,000 for the purchase of an aircraft to provide rapid transportation of personnel, emergency crews, and parts to remote locations which have inadequate or no commercial airline service. The balance of funds are required for the replacement or addition of transportation and heavy equipment which meet GSA replacement or safety replacement criteria. Equipment to be replaced meets age and/or mileage standards and is required to properly operate and/or maintain the transmission system. Items planned for FY 1984 include: $300,000 for a derrick crane; $219,000 for a tractor crawler; $125,000 for a boom truck with digger; $90,000 for an earth auger; and $60,000 for an insulator washer as well as pickups, sedan deliveries, line trucks, trailers, helicopter parts, a portable air compressor, snow vehicles, and tractors.

Communication and control equipment ($ 2,414,000).

The request provides for replacement and additions of miscellaneous telemetering, supervisory control, carrier, radio, protective relaying, and other equipment. The balance of the request includes $1,311,000 for communications and the ADP support system for the Pick-Sloan Missouri Basin program. Scheduled items include $436,000 to upgrade ADP support for communications processors, cabling and interfaces, power billings, and management information systems; $325,000 for replacement of telemetering equipment; $275,000 for testing equipment; and $150,000 to replace and $125,000 to extend remote terminals, cable, and peripheral equipment to the power control system.

Various maintenance facilities ($ 505,000).

Provides $200,000 for construction of various warehouse, storage areas, and maintenance facilities at Gering, Nebraska, and Cody, Wyoming; $65,000 for replacement of an obsolete control building at Sidney Substation which will be used to house future additions such as supervisory control and data acquisition equipment; $160,000 to upgrade the Phoenix District Office with energy efficient air-conditioning and lighting systems and to reroof the building; and $80,000 to upgrade insulation, install solar hot water heaters, and conduct energy audits at substations.

Tools and work equipment ($ 891,000).

The request provides for acquisition of tools designed for hot line maintenance and for transmission system test equipment. The balance of the request provides for various shop equipment, office equipment, and other miscellaneous tools required to properly operate and maintain the transmission system.

PURCHASE POWER AND WHEELING
GENERAL STATEMENT

Summarized Financial Data

FY 1983

Appropriation	$25,164,000
Application of Prior Year Funds	33,004,000
Purchase power and wheeling costs offset by credits from sale of power and from rents for wheeling non-Federal power on Western's transmission lines	12,277,000
Total FY 1983	$70,445,000

FY 1984

Estimate of Appropriation	$68,000,000
Purchase power and wheeling costs offset by credits from sale of power and from rents for wheeling non-Federal power on Western's transmission lines	14,402,000
Total FY 1984	$82,402,000

Western's major purchase power requirement is associated with the Central Valley program (CVP) in California. Western also purchases power in connection with the Pick-Sloan Missouri Basin program (P-SMBP).

The current marketing program for the CVP was initiated in the mid 1960's with the advent of the Pacific Northwest-Pacific Southwest Intertie, which is used to import capacity and energy from the Northwest. The intertie provides CVP with 400 megawatts (MW) of transmission capacity. The intertie, together with the continuation of the contractual arrangements with Pacific Gas and Electric Company (PG&E) under which the CVP hydro system is operationally integrated with the PG&E system, allows the CVP to serve a firm load which is about two and one-half times the load which the CVP hydro system could serve on its own.

Under average water conditions, the CVP could provide a firm power supply of approximately 450 MW. As a result of the integration contract with PG&E and the import of capacity and energy from the Northwest, the CVP is able to provide a firm resource of 1,152 MW.

The increase in load carrying capability which was initiated by the Pacific Northwest-Pacific Southwest Intertie was the result of a program started by the Congress under which the CVP was obligated to meet the load requirements of the municipal customer loads within the service area until 1980 or until a maximum load of 1,050 MW was reached. This obligation was further extended to 1,152 MW as a result of the Santa Clara settlement which provided the City of Santa Clara with a firm allocation of power and under which PG&E agreed to support a higher load level.

Realistically, the CVP hydro system can meet the capacity (megawatt) requirements of a normal system load but cannot always meet the energy (kilowatthour) requirements of that load. The ability to meet the energy requirements depends upon the continued availability of water.

Therefore, CVP relies upon the energy banking arrangements in the integration contract with PG&E, plus the purchase of energy from outside sources, to meet the energy requirements of its load. Under the banking arrangement in any month, energy, generated or imported, which is surplus to the needs of CVP is "banked" with PG&E under an arrangement which allows Western to purchase the energy back during months when it is required to meet load. There are two energy bank accounts with PG&E. Energy Account Number 1 was "closed to additional deposits" in 1967 when the PG&E contract was renegotiated. The rate for purchase from that account was set at the average rate at which energy went into the account plus 15 percent. This rate is 2.8 mills per kilowatthour (kWh). At this same time, Energy Account Number 2 was initiated. The rate for energy from this account is based on the average cost of energy from PG&E's thermal, nuclear, and geothermal units.

The CVP currently supplies approximately 8 billion kWh to meet project and preference customer load. Of this amount, approximately 3 billion kWh is purchased either out of the bank account or from outside sources.

The integration contract with PG&E is in effect until the year 2004. Therefore, under current contractual arrangements, Western is committed to this program until expiration of the PG&E contract. To the extent that CVP can import lower cost energy from coal-fired units, this arrangement provides a power supply to the CVP customers at a lesser cost.

The CVP includes a backbone transmission system which provides transmission from the generating plants to the project loads. In order to deliver power to the many preference customers, the integration contract with PG&E provides for wheeling service over the PG&E system. Over 50 percent of the energy sold to preference customers is delivered over the PG&E system.

The P-SMBP, which is located in the States of Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, North Dakota, South Dakota, and Wyoming, markets capacity and energy in amounts which are essentially based on what is available from the project generation. The amount of capacity to be marketed is determined on the basis of an adverse cycle of water years, approximating a 90 percent probability of assurance while the amount of energy available is based on an average water year. Therefore, during periods of less than average water, there is a need to purchase energy. These purchases are made from both public and private entities. During periods of above average water, both surplus capacity and energy are available. This surplus capacity and energy is marketed to customers on a short-term basis. Often the surplus capacity and energy is marketed as maintenance energy to other utilities which have units down for maintenance and as emergency service to utilities which lose a generating unit. Excess capacity and energy is also marketed in the oil conservation program.

The P-SMBP also, in some instances, provides energy to preference customers at a load factor greater than the project can generate. This additional energy is provided through purchases at the time of need. The rate for such additional energy is based on Western's cost to purchase such energy. These costs are included in the annual rate and repayment study and therefore are recovered in the rate for such energy.

Annual energy sales from the P-SMBP average about 11 billion kWh with revenues of over $100,000,000. Of this amount, approximately, 150 million kWh are purchased and sold directly to preference customers. Firming energy requirements for the P-SMBP vary considerably year to year depending on the amount of water available. During the last 5-year period, the annual requirement has approached one billion kWh with costs up to $11,000,000 per year.

Firm capacity and energy are marketed under long-term contracts. The existing contracts with almost 300 customers are in effect until the year 2000.

While the P-SMBP has an extensive transmission system, it also utilizes the systems of other utilities in the delivery of power and energy to some of its customers. In addition, the Federal transmission system is integrated with the other systems in the area into what is called the Joint Transmission System. This arrangement provides a means of making transmission capacity available in the area in the most efficient manner. Charges are established for use of the system and the revenues are divided among the owners based on each owner's proportionate share of investment. This is another service which adds to the revenues to meet repayment obligations and provides cost savings to all utilities in the area. Western's share of the annual revenues is about $16 million.

Another part of the purchase power and wheeling program is the oil conservation activity. This program activity displaces oil-, gas-, and coal-fired generation by using hydroenergy available through the flexibility and use of large reservoirs. Surplus low cost thermal energy is purchased during the offpeak load period to supply Western's customers; this allows water to be stored in reservoirs for later use. Hydropower is then sold during onpeak load periods at 85 percent of fuel cost or at a split saving arrangement to customers who otherwise would use oil-, coal-, or gas-fired generation. The success of this program relates directly to the availability of offpeak economical coal-fired generation to couple with the hydrosystem for displacement of oil-fired generation.

Accomplishments:

- The ongoing oil conservation program resulted in displacement of approximately 6.2 million equivalent barrels of oil in 1982, with associated equivalent revenues of about $30 million. From December 1972 through September 1982, over 53 million equivalent barrels of oil have been displaced through this program. Since 1972, equivalent revenues associated with sales from the Oil Conservation Program have amounted to over $250 million. These revenues were returned to the U.S. Treasury and applied to project repayment, and are in addition to those collected from normal power sales and have the effect of minimizing Western's firm power rate increases. These statistics include activity discussed under the Colorado River Basins Power Marketing Fund.

- During 1981, Western inaugurated a new resource coordination program in the Colorado-Wyoming area. This program is an arrangement in which our generation resources are operationally integrated with thermal generation in the area. Without committing Federal capacity and energy, Western provides shaping and storage services which facilitate the transfer of offpeak energy to onpeak use to enhance the value of the participants' surplus thermal energy. The onpeak energy is then sold to displace oil-fired generation. During the first year of operation, Western marketed a total of 1.97 billion kilowatthours of surplus energy. The enhanced value was shared between Western and the contributors of the surplus thermal energy. Western's share was approximately $1,560,000.

- In FY 1983 Western expects to displace an estimated 3 million barrels of oil annually. Of this total, about 1 million barrels of oil are associated with activities within this appropriation account.

Objectives:

- To displace an estimated 3 million barrels of oil, about 1 million barrels of which are associated with activities within this appropriation account.

- To meet power delivery commitments to preference customers.

FY 1984 Budget Request:

The FY 1984 appropriation request of $68,000,000 provides for purchase of power to meet customer power load deliveries under existing contracts. The establishment in 1961 of a net billings procedure for certain of these power transactions between Federal Government and non-Federal utilities precludes the need for an additional $14,402,000 in FY 1984. Due to the termination of Western's Centralia Thermal Project agreement in December 1981, Western is required to purchase power from other sources at greater cost in order to meet Western's contractual commitments in California, increasing purchase power requirements.

Western's purchase power funding requirements for the Central Valley program in California will increase significantly in future years due to depletion of cheaper cost, banked energy, and the requirement to purchase higher-cost (e.g., oil-fired) energy from the open market to meet loads under existing contracts. Present funding levels are based on marketing practices developed before FY 1982. However, negotiations are currently underway which may lead to future years funding level reductions through bill crediting arrangements.

This procedure involves contractual arrangements with one or more CVP customers under which the customers provide the funding required for the purchase of the energy. Under this procedure, while Western would maintain the operational responsibility and the obligation to deliver the energy to the CVP customers, the customers would make payment directly to the supplier.

Western has discussed this procedure with its CVP customers and the reaction has been favorable. They are now in the process of drafting the required documents and reviewing the legal authorities to enter into such an agreement. The degree to which this would reduce the requirement for appropriations required for purchase power depends upon the number of CVP customers willing to provide funding; however, discussions related to the purchase of energy for transmission from the Dakotas to CVP indicate that the customers are favorable to funding this energy purchase. This would reduce CVP purchase power appropriations by nearly 50 percent and would amount to approximately $100,000,000 in FY 1987.

The FY 1984 request is based on utilization of Federally generated energy assuming average water conditions, lower cost banked energy, and minor energy support purchases to meet firm contractual obligations in California. Western will continue to work on arrangements to import coal-fired energy into the CVP system at a cost which would be somewhat less than the cost of energy from PG&E's oil-fired plants.

However, in order to transmit this energy to CVP, it is necessary to construct an a.c.-d.c.-a.c. tie between the east and west transmission systems in Montana and to obtain transmission through Montana Power Company and the Bonneville Power Administration. Western and Basin Electric Cooperative are currently in the process of constructing such an a.c.-d.c.-a.c. tie. The tie is scheduled for completion in 1985. In addition, Western is negotiating with Bonneville Power Administration for use of its transmission system in addition to the use of the Colstrip Project transmission system across Montana. When these arrangements are completed, Western will have the ability to transmit power from the Dakotas to CVP.

While this will provide energy to CVP at a somewhat lower cost, the budget requirements are still substantial. The annual costs for this power supply will approach $100,000,000. This power supply will provide an estimated 165 MW of capacity and 1.1 billion kWh of energy annually. This is approximately one-half of CVP's purchase power requirements.

The FY 1984 request also provides for continuing participation in the oil conservation program. Under this appropriation account, Western expects to conserve about 1 million barrels of oil annually. In addition, the plan provides for customer load coordination efforts through energy transfers between river basins by displacing current oil-fired generation. This program seeks, within the limits of water use constraints and transmission limitations, to integrate dispatch of area hydro and thermal generation in the most economic manner to meet area load obligations.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Key Activity Summary
Western Area Power Administration
Construction, Rehabilitation, Operation and Maintenance
(In thousands of dollars)

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Construction and Rehabilitation	Complete planning studies and continue environmental activity, field data collection and land and rights activities for Great Falls-Conrad Transmission Line.	Complete land and rights activities, environmental work, field data collection, and design phase of Great Falls-Conrad Transmission Line. Initiate construction of Great Falls-Conrad Transmission Line.
	Continue construction activities on Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV transmission system, Phase I.	Continue construction activities on Hayden-Craig Shiprock-San Juan-Four Corners 345-kV transmission system, Phase I.
	Continue construction of Craig-Rifle 345-kV Transmission Line.	Complete construction and all phases of activity on Craig-Rifle 345-kV Transmission Line.
	Conduct environmental studies, field data collection, land and rights activities, and prepare designs and specifications for Crossover Substation, Miles City Substation, and the a.c.-d.c.-a.c. tie addition in southeastern Wyoming/western Nebraska; continue construction of the Miles City East-West a.c.-d.c.-a.c. tie.	Complete field data collection and land and rights activities; prepare designs and specifications for a.c.-d.c.-a.c. ties in southeastern Wyoming/western Nebraska; and continue construction of the Miles City a.c.-d.c.-a.c. ties and related facilities.
	Initiate planning studies, environment activities and field data collection for the Billings Area Microwave System.	Complete planning studies, environment activities and field data collection; initiate land and rights activities; complete designs and specifications; and initiate construction of the Billings Area Microwave System.

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Construction and Rehabilitation	Complete planning studies, continue environmental activity and initiate field data collection and design effort for the Liberty-Coolidge 230-kV transmission line and terminal facilities.	Complete environmental activity and designs and specifications; initiate land acquisition and other construction activities for Liberty-Coolidge 230-kV transmission line and terminal facilities.
	Continue preconstruction and construction activities for Western-wide transmission lines and terminal facilities additions. These activities include reconductoring transmission lines, replacing damaged wood or steel structures, and upgrading various transmission lines. Work will completed on Beaver Creek-Weld 115-kV transmission line, Sterling-Holyoke 69-kV Transmission Line and Folsom-Nimbus Transmission Line.	Continue preconstruction and construction activities for Western-wide transmission lines and terminal facilities additions. Construction will be completed on the Coolidge-Saguaro 115-kV Transmission Line upgrade, Holyoke-Wauneta Transmission Line and terminal facilities, Flatiron-Big Thompson Transmission Line and Dallas Creek Transmission Line and terminal facilities.
	Complete field data collection and environmental activity and initiate design effort for the Thermopolis-Alcova 230-kV transmission line and terminal facilities.	Complete designs and specifications and initiate land acquisition and other construction activities for the Thermopolis-Alcova 230-kV transmission line and terminal facilities.
	Complete construction of White-Brookings 230-kV Transmission Line and Brookings Substation Stage 06. Initiate design effort on White Substation Stage 06.	Complete designs and specifications; initiate construction of White Substation Stage 06.

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Construction and Rehabilitation	Continue preconstruction and construction activities on Western-wide substation additions and modifications. Work will be completed on Fargo Substation Stage 04, Pilot Butte Substation, Limestone Substation, and Poudre Substation.	Continue preconstruction and construction activities on Western-wide substation additions and modifications. Work will be completed on Huron Substation additions, Dawson County Substation, Fargo Substation, Fort Thompson Substation, Thermopolis Substation, and Folsom Switchyard.
	Continue preconstruction and construction activities on various operations, maintenance, and other facilities Western-wide.	Continue preconstruction and construction activities on various operations, maintenance, and other facilities Western-wide.
	Complete planning studies and initiate and complete field data collection and environmental activity, and initiate design effort for the Gering-Archer 115-kV transmission line.	Complete designs and specifications and initiate land acquisition and other construction activities for Gering-Archer 115-kV transmission line.
Operations and Maintenance	Conduct ongoing operation and maintenance activities on projects involving about 13,000 miles of transmission lines and associated facilities.	Continue ongoing operation and maintenance activities including staffing and maintaining the newly completed Miles City Converter Station; testing and replacing deteriorating line structures; rehabilitating facilities transferred from the Bureau of Reclamation and maintaining newly energized facilities; and calibrating system hardware.

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Operations and Maintenance	Perform power system control and dispatching; power marketing, billing and collecting; conservation and renewable resource development activities; and provide for other administrative and general expenses.	Continue power system control dispatching functions, power marketing billing and collecting, conservation and renewable resources development activities, including installation of a major Supervisory Control and Data Acquisition System. Provides for an increase in the power dispatch staff to meet additional marketing requirements, and expansion of the billing program in response to an expanded metering system; also provides for administrative and general expenses including funding to move and improve the Power Operators Training Center, installation of an Interactive Graphics System and Laboratory and other ADP hardware, and for contracting for engineering and support services, and equipment and aircraft maintenance.
	Provide power system replacements and additions, including substation, mobile, and communication and control equipment. Complete installation of major substation equipment at several locations.	Continue acquisition of power system replacements including a fixed-wing aircraft and hardware for the Supervisory Control and Data Acquisition System.
Purchase Power and Wheeling	Provides for: purchase and transmission of power to meet firm contractual obligations for Western's power customers; and replacement of high cost oil-fired power generation with low cost hydropower, thereby conserving oil and increasing power revenue.	Provides for increased costs for purchase and transmission of power to meet firm contractual obligations for Western's power customers; and replacement of high cost oil-fired generation with low cost hydropower, thereby conserving oil and increasing power revenues.

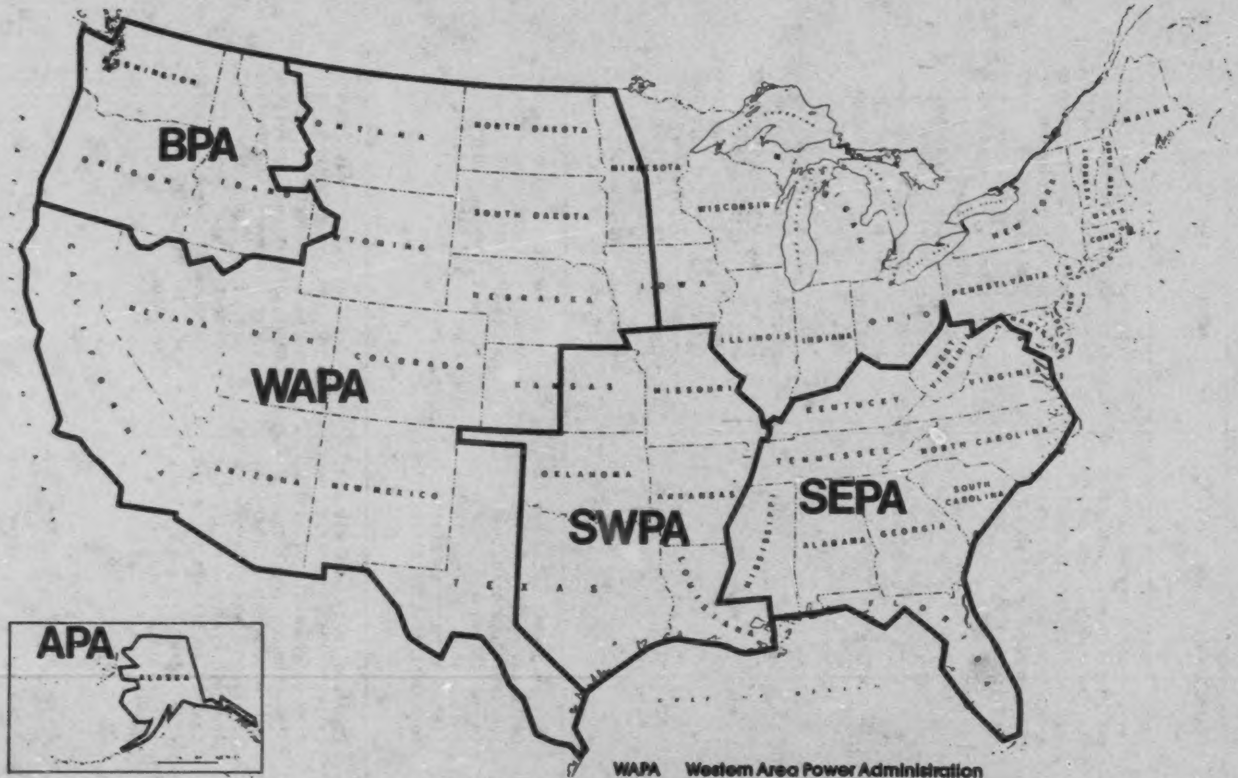
Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SYSTEM STATISTICS
Western Area Power Administration
(In thousands of dollars)

	FISCAL YEAR ESTIMATES		
	1982	1983	1984
Generating Plants (No.)	48	49	49
Generating capacity:			
Installed capacity (kW)	8,321,053	8,366,353	8,466,353
Substations:			
Number	228	229	230
Capacity (kVA)	1,460,483	1,460,483	2,010,483
Available energy: (MWh)			
Net generation 1/	30,737,000	32,054,000	33,858,000
Purchases	5,396,000	5,106,000	5,053,000
Energy available for marketing	36,133,000	37,160,000	38,911,000
Transmission lines (circuit miles):			
500 kV	94.27	94.27	94.27
345 kV	1,274.46	1,274.46	1,381.66
230 kV	6,567.17	6,579.67	6,476.17
161 kV	1,035.95	1,035.95	1,035.95
138 kV	317.79	317.79	317.79
115 kV	5,756.26	5,756.26	5,803.26
69 kV and below	1,132.59	1,154.09	1,159.89
Total circuit miles	16,178.49	16,212.49	16,268.99
DOE revenues:			
Revenue from electric service	$391,872	$453,555	$545,927

1/Excludes transmission losses.

Power Marketing Administrations


BPA
WAPA
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APA
WASHINGTON
OREGON
IDAHO
MONTANA
WYOMING
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
MINNESOTA
IOWA
WISCONSIN
CALIFORNIA
NEVADA
UTAH
COLORADO
KANSAS
MISSOURI
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
NEW YORK
MAINE
WEST VIRGINIA
VIRGINIA
KENTUCKY
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
ARIZONA
NEW MEXICO
OKLAHOMA
ARKANSAS
TEXAS
LOUISIANA
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
ALASKA

WAPA	Western Area Power Administration
APA	Alaska Power Administration
BPA	Bonneville Power Administration
SEPA	Southeastern Power Administration
SWPA	Southwestern Power Administration

Department of Energy

Western Area Power Administration

ESTIMATED ENERGY SALES FY 1982 THROUGH FY 1988 (IN GWH)

	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88
Boulder Canyon Project	3,193	3,276	5,056	4,362	4,535	4,705	4,300
Central Arizona Project (Facilities and Capacity)	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Central Valley Project	8,964	8,251	8,167	8,147	8,190	8,180	7,839
Collbran Project	61	47	47	47	47	47	47
Colorado River Basin Project (Navajo)	3,944	3,800	3,800	2,036	1,172	406	359
Colorado River Storage Project1/	6,440	6,840	6,857	6,871	7,003	7,003	7,003
Falcon-Amistad Projects	140	202	260	260	260	260	260
Fryingpan-Arkansas Project	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Parker-Davis Project	1,143	1,628	1,540	1,354	1,446	1,431	1,389
Pick-Sloan Missouri Basin Program	12,167	13,023	13,091	13,096	13,211	13,080	13,077
PNW-PSW Intertie	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Provo River Project2/	27	18	18	18	18	18	18
Rio Grande Project	80	75	75	75	75	75	75
TOTAL	36,133	37,160	38,911	36,266	35,957	35,205	34,366

NOTE: Totals may not equal sum of components due to independent rounding.

1/ Includes a portion of fuel replacement sales credited to Parker-Davis Project.

2/ Includes 27 GWh of interproject sales to Colorado River Storage Project, which is not added into Western's total energy sales for FY 1982.

Department of Energy

Western Area Power Administration

ESTIMATED POWER REVENUES FY 1982 THROUGH FY 1988 (IN $000)

	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88
Boulder Canyon Project	15,117	21,967	27,650	26,363	27,093	27,839	32,250
Central Arizona Project (Facilities and Capacity)	120	120	120	120	120	120	120
Central Valley Project	94,167	111,654	184,315	216,998	251,322	285,521	286,091
Collbran Project	468	470	996	996	996	996	996
Colorado River Basin Project (Navajo)	66,985	77,178	81,284	45,974	28,175	10,444	9,784
Colorado River Storage Project	80,974	85,822	90,130	95,885	91,636	91,815	92,054
Falcon-Amistad Projects	1,954	1,824	3,120	3,120	3,120	3,120	3,120
Fryingpan-Arkansas Project	-0-	3,732	4,665	7,464	7,464	7,464	7,464
Parker-Davis Project	14,875	17,392	20,422	19,179	19,943	17,865	17,865
Pick-Sloan Missouri Basin Program	113,441	128,875	128,255	130,021	131,852	135,118	134,079
PNW-PSW Intertie	2,341	2,754	2,884	2,885	2,747	2,747	2,747
Provo River Project	161	94	94	94	94	94	94
Rio Grande Project	1,430	1,673	1,992	2,009	2,009	2,009	2,009
TOTAL	391,872	453,555	545,927	551,109	566,571	585,153	588,675

NOTE: Totals may not equal sum of components due to independent rounding.
1/ Includes a portion of fuel replacement sales credited to Parker-Davis Project.
2/ Includes $161,000 of interproject revenue from Colorado River Storage Project which is not added into total revenue for FY 1982.

Department of Energy
Western Area Power Administration
REVENUES AND RECEIPTS
(In thousands of dollars)

	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Gross Revenues (CRO&M)	$243,793	$290,435	$374,393	$409,130	$446,640	$482,774	$486,717
Gross Revenues (CRB)	148,079	163,120	171,534	141,980	119,931	102,380	101,960
Receipts:							
Sale and transmission of electric energy - Falcon Dam 1/	22	22	26	26	26	26	26
Reclamation Fund, all other, sale of power and other utilities	128,506	215,835	281,093	320,996	369,373	406,834	406,865
Sale of power and other utilities, not otherwise classified	23,900	24,000	24,000	24,000	24,000	24,000	24,000
Receipts, Colorado River Dam Fund, Boulder Canyon Project	11,057	21,967	27,650	26,363	27,093	27,839	32,250
Net billing account credited back to appropriation as an offsetting receipt	13,305	12,277	14,402	13,811	14,265	14,428	14,272
Percent of energy sales to preference customers	84%	84%	84%	84%	84%	84%	84%
Capital Transfers to General Fund	1,500	4,000	25,214	5,000	5,000	5,000	5,000
Gross Revenues returned to Revolving Fund	93,400	93,400	101,500	99,500	88,500	88,500	93,600
Energy Sales from Power Marketed (in GWH)	36,133	37,160	38,911	36,266	35,957	35,205	34,366

1/Includes receipts from sale and transmission of electric energy - Amistad Project.

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

	Fiscal Year 1983			Fiscal Year 1984		
Area and Utility	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Funds Required	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Appropriation Required
Sacramento Area						
Pacific Gas and Electric, and Others	$49,555	$ -310	$49,245	$54,473	$-1,664	$52,809
Billings Area						
Basin Electric Power Cooperative .	4,514	-3,053	1,461	3,324	-1,498	1,826
Black Hills Power and Light Co.	98	-98	---	122	-122	---
Central Iowa Power Cooperative	70	-70	---	88	-88	---
Corn Belt Power Cooperative	271	-271	---	339	-339	---
Dairyland Power Cooperative	3	-3	---	3	-3	---

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

	Fiscal Year 1983			Fiscal Year 1984		
Area and Utility	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Funds Required	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Appropriation Required
Billings Area (Continued)						
East River Electric Power Coop., Inc.	520	-520	---	760	-760	---
Interstate Power Company	230	-230	---	288	-288	---
Iowa Electric Light and Power Co.	50	-45	5	66	-59	7
Iowa Power and Light Co.	71	-63	8	86	-72	14
Iowa Public Service Co.	120	-106	14	152	-118	34
Iowa Southern Utility	1	-1	---	1	-1	---
L & O Power Cooperative	117	-117	---	145	-145	---
Minnesota Power and Light Co.	518	-102	416	647	-127	520
Minnkota Power Coop., Inc.	364	-364	---	454	-451	3
Montana Dakota Utilities Co.	530	-530	---	660	-660	---

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
Western Area Power Administration

Project	State	No. of Plants	Installed Capacity(MW)	FY 1982 Estimated Power(GWH)	FY 1983 Estimated Power(GWH)	FY 1984 Estimated Power(GWH)
Power Marketed						
Boulder Canyon	AZ	1	-	557	557	707
	CA	-	-	1,990	2,064	3,564
	NV	-	-	646	655	785
Subtotal		1	1,389	3,193	3,276	5,056
Central Valley	CA	10	1,751	8,964	8,251	8,167
Subtotal		10	1,751	8,964	8,251	8,167
Collbran	CO	2	14	61	47	47
Subtotal		2	14	61	47	47
Colorado River Basin (Navajo)	AZ	1	547	955	920	920
	CA	-	-	2,891	2,785	2,785
	NV	-	-	98	95	95
Subtotal		1	547	3,944	3,800	3,800
Colorado River Storage	AZ	1	1,021	853	1,072	1,072
	CA	-	-	568	660	660
	CO	3	208	1,568	1,682	1,682
	NV	-	-	387	245	245
	NM	-	-	891	935	953
	UT	1	108	1,557	1,664	1,664
	WY	1	10	616	582	582
Subtotal		6	1,347	6,440	6,840	6,857
Falcon-Amistad	TX	1	32	140	202	260
Subtotal		1	32	140	202	260
Fryingpan-Arkansas	CO	1	100	-0-	-0-	-0-
Subtotal		1	100	-0-	-0-	-0-
Pacific Northwest-Southwest Intertie	AZ	-	-	-0-	-0-	-0-
	CA	-	-	-0-	-0-	-0-
	NV	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-

Note: Totals may not equal sum of components due to independent rounding.

Project	State	No. of Plants	Installed Capacity(MW)	FY 1982 Estimated Power(GWH)	FY 1983 Estimated Power(GWH)	FY 1984 Estimated Power(GWH)
Power Marketed, (Continued)						
Parker-Davis	AZ	1	240	717	778	782
	CA	1	60	157	463	415
	NV	-	-	268	387	343
Subtotal		2	300	1,143	1,628	1,540
Pick-Sloan Missouri Basin Program	CO	6	201	815	1,071	1,071
	IA	-	-	1,947	1,595	1,613
	KS	-	-	1	0	0
	MN	-	-	2,770	3,027	3,054
	MO	-	-	26	0	0
	MT	3	485	788	690	690
	NE	-	-	2,439	2,628	2,645
	ND	1	430	1,341	1,284	1,289
	SD	4	1,483	1,505	1,810	1,811
	WY	8	214	535	630	630
Subtotal		22	2,813	12,167	13,023	13,091
Provo River[1]	UT	1	5	27	18	18
Subtotal		1	5	27	18	18
Rio Grande	NM	1	24	80	75	75
Subtotal		1	24	80	75	75
Subtotal, Power Marketed		48	8,321	36,133	37,160	38,911
Power Wheeled for Others						
Boulder Canyon	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Central Valley	-	-	-	3,708	3,929	3,906
Subtotal		-	-	3,708	3,929	3,906
Collbran	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Colorado River Basin	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Colorado River Storage [2]	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Falcon-Amistad	-	-	-	-0-	-0-	-0-
Subtotal	-	-	-	-0-	-0-	-0-

[1] Includes 27 GWh of interproject sales to Colorado River Storage Project which is not added into Western's total energy sales for FY 1982.

[2] Wheeling is based on capacity rather than energy.

Note: Totals may not equal sum of components due to independent rounding.

Project	State	No. of Plants	Installed Capacity(MW)	FY 1982 Estimated Power(GWH)	FY 1983 Estimated Power(GWH)	FY 1984 Estimated Power(GWH)
Power Wheeled for Others, (Continued)						
Fryingpan-Arkansas	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Pacific Northwest-Southwest Intertie	AZ	-	-	210	210	210
	CA	-	-	210	210	210
	NV	-	-	0	0	0
Subtotal		-	-	420	420	420
Parker-Davis	AZ	-	-	4,247	580	599
	NV	-	-	132	38	19
Subtotal		-	-	4,379	618	618
Pick-Sloan Missouri	MT,ND,SD,MN	-	-	679	679	679
Basin Program	IA,NE,CO,WY	-	-	2,134	3,559	3,713
Subtotal		-	-	2,813	4,238	4,392
Provo River	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Rio Grande	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Subtotal, Power Wheeled for Others		-	-	11,320	9,205	9,336
Summary Power Marketed and Wheeled for Others						
Boulder Canyon		1	1,389	3,193	3,276	5,056
Central Valley		10	1,751	12,672	12,180	12,073
Collbran		2	14	61	47	47
Colorado River Basin		1	547	3,944	3,800	3,800
Colorado River Storage		6	1,347	6,440	6,840	6,857
Falcon-Amistad		1	32	140	202	260
Fryingpan-Arkansas		1	100	-	-	-
Pacific Northwest-Southwest Intertie		-	-	420	420	420
Parker-Davis		2	300	5,522	2,246	2,158
Pick-Sloan Missouri Basin		24	2,813	14,980	17,261	17,483
Provo River1/		1	5	27	18	18
Rio Grande		1	24	80	75	75
Total Power Marketed and Wheeled for Others		48	8,321	47,453	46,365	48,247

1/ Includes 27 GWh of interproject sales to Colorado River Storage Project which is not added into Western's total energy sales for FY 1982.

Note: Totals may not equal sum of components due to independent rounding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION

Western Area Power Administration

City of Anaheim, California, et al. v. Schlesinger. Appeal was filed in the United States Court of Appeals, 9th Circuit, on May 6, 1977, from U.S. District Court for Arizona, filed February 15, 1974, denying a request for mandamus and for injunctive and declaratory relief against the United States regarding its sale of Navajo Project power and energy to nonpreference customers. The decision of the district court was affirmed December 13, 1978. A motion for Summary Judgment on the merits of the case was granted in favor of the Government. On October 13, 1981, the 9th Circuit Court of Appeals affirmed the decision of the district court, holding that the United States did not violate the terms of the preference clause of reclamation law in marketing power from the Navajo steamplant.

City of Santa Clara, California v. Duncan, et al. Suit challenged the Secretary's action of withdrawing temporary commitments of the Central Valley Project (CVP) power and asserted that the CVP power which was "banked" with PG&E was a sale in violation of the preference clause of §9(c) of the Reclamation Act of 1939, 43 U.S.C. §485h(c). The U.S. District Court upheld the Secretary as to both the allocation decision and the PG&E banking arrangement. The 9th Circuit Court of Appeals affirmed the Secretary's allocation decision, but reversed as to the banking arrangements and remanded to district court. A settlement agreement has been entered into and has been approved by the court. The Government is no longer subject to a maximum liability of approximately $100,000,000. A motion made by several companies served by Santa Clara to intervene in the lawsuit at the last moment was denied by the District Court. The companies have appealed the Court's order and the issue is now pending before the 9th Circuit Court of Appeals. Two related lawsuits before the Court of Claims, City of Santa Clara v. United States, (148-77) and Pacific Gas and Electric Company v. United States (7-79), are anticipated to be dismissed pursuant to the settlement agreement.

Ruth Hahn, Special Administrator for the Estate of Barbara Ruth Hahn v. United States of America and James Kostboth. Suit for wrongful death of a private plane passenger when the plane struck a Western 230-kV transmission line. Complaint filed October 16, 1978. Approximate amount claimed by plaintiff was $500,000. The case came to trial in the South Dakota District Court, and in a decision rendered on March 17, 1982, the United States was found not negligent. Hahn v. United States, 535 F.Supp. 132 (D.S.D. 1982). The Appellate Court later confirmed the trial court's decision.

United States of America v. Sacramento Municipal Utility District (SMUD). United States seeks a declaratory judgment interpreting the rate adustment provisions of defendant's power contract with Western. The primary dispute between the parties is whether, under the contract, SMUD is liable for any portion of future rate increases which is attributable to the importation of power from the Pacific Northwest and other costs not related to pure hydroelectric generation. The district court granted partial summary judgment in favor of Western on this issue on April 6, 1979. The judgment was appealed by SMUD and the 9th Circuit Court of Appeals reversed on August 12, 1981. The case is currently awaiting trial. Maximum liability is approximately $630,000,000.

United States of America v. State of California, State Water Resources Control Board, et al. United States seeks a declaratory judgment to appropriate water for New Melones Dam and Powerplant from the Stanislaus River to prevent the State from conditioning its water permit. The United States position was upheld by the District Court and the 9th Circuit Court of Appeals. United States Supreme Court reversed, holding that the State could condition its water permits in a manner not inconsistent with Congressional mandates. The case was remanded to district court, which decided that the State's conditions were valid except to the extent they prevented water storage for power generation. The State of California appealed the District Court's opinion to the 9th Circuit Court of Appeals where the matter is currently pending. Maximum liability is approximately $14,000,000.

Theodore D. Bross Line Construction v. Wendall, et al. Suit challenged payment of state use tax by a contractor in conjunction with a Federal construction project. The action was filed in the U.S. District Court for the District of South Dakota. The plaintiff is seeking indemnification damages from the United States equal to the amount assessed by the State of South Dakota. The United States filed a motion to dismiss for lack of subject matter jurisdiction, and the motion was granted. As this order has not been appealed, the district court decision is final. In a related case, the contractor appealed to the Court of Claims from an adverse decision of the Energy Board of Contract Appeals on the state use tax issue. The appeal is still pending. The approximate amount claimed by the contractor is $400,000.

Citizens and Landowners Against the Miles City/New Underwood Powerline (CLAMP) v. the United States, CIV #81-5021. Plaintiffs, 5 of a total of 11 landowners whose property is the subject of condemnation action, sought a declaratory judgment and permanent injunction challenging the propriety and construction of the Miles City/New Underwood powerline and alleged violations of Federal and State statutes, in particular the National Environmental Policy Act. After trial on April 28-30, the District Court for the District of South Dakota held in a Memorandum Opinion of May 5, 1981, that the government had complied with all Federal statutes, had prepared an adequate environmental impact statement and was not required to comply with any State statute. The South Dakota Public Utilities Commission, plaintiff intervenor, has appealed to the 8th Circuit on the issue of required Federal agency compliance with South Dakota State Siting Act, SDCL 49-41B. On July 16, 1982, the 8th Circuit Court of Appeals affirmed the decision of the district court.

Arvin-Edison Water Storage District, et al. v. Edwards, et al. Plaintiff and 10 other irrigation districts located in the Central Valley of California filed suit on September 1, 1982. The districts allege that Western's allocation of 102 megawatts violates the letter, spirit, and intent of reclamation law by impairing the efficiency of the Central Valley Project for irrigation purposes. Liability exposure has not yet been determined.

Nevada v. United States, et al. The State of Nevada filed suit on August 27, 1982, alleging that Western's Proposed General Consolidated Power Marketing Criteria or Regulations for Boulder City Area Project - Revision are final rules which violate the provisions of the Boulder Canyon Project Act. Nevada seeks a declaratory judgment that it is entitled to one-third of the total electrical output of Hoover Dam upon expiration of existing contracts in 1987. The State of Arizona filed a motion to intervene as a party plaintiff on September 9, 1982. Liability exposure has not yet been determined.

McCullough v. United States of America, CIV-81-512. Suit for personal injury of Tucson Electric employee brought under the Federal Tort Claims Act. On or about February 17, 1980, Robert McCullough sustained a head injury when he was thrown against the dashboard of a Ford Bronco while traveling as a passenger through an easement owned by the U.S. Government, Department of Energy, Western Area Power Administration. Two Standard Form 95's were filed by Mr. McCullough and Grace G. McCullough, claiming damages in the amounts of $2,000,000 and $1,000,000 respectively as a result of the injury sustained by Mr. McCullough. Both claims were administratively denied on May 14, 1982. A civil suit was filed against the United States in the District of Arizona on October 30, 1981. A summons was received by the Department of the Interior, Bureau of Reclamation on or about November 30, 1981. It was forwarded to Western on December 10, 1981. Whether or not the Bureau was properly served is unknown, however, it is our understanding the U.S. Attorney for the District of Arizona was served on January 28, 1982 and an answer was filed in March of 1982. It is our conclusion that the action was commenced within the time specified in 28 U.S.C. §2401(b) and the jurisdictional prerequisite has been established in the plaintiff.

Arizona Power Authority v. Edwards, No. 81-5334 (9th Cir.) was an appeal from a judgment in favor of the United States on the issue of compensation for power delivered to a number of preference customers pursuant to a stay order. The appeal objected to the District Court's rejection of the power customer's argument that damages were limited to the face amount of an undertaking to stay. The appellants also disputed the method of computation of damages used by the United States. Judgment was entered in favor of the United States on April 29, 1982.

City of South Sioux City v. Edwards, CV 82-L-107 (D.Neb. 1982). Four cities in Nebraska filed suit attacking Western's Post-1985 Marketing Plan on a number of different grounds. Western has filed a motion for summary judgment, asserting that none of the plaintiffs filed their applications before the administrative deadline for such applications for power. The plaintiffs have filed their own motion for summary judgment, alleging that Western's allocation procedures were fatally defective. Both sides are awaiting oral argument. Maximum liability is unknown at the present time.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

COLORADO RIVER BASINS POWER MARKETING FUND
OPERATING EXPENSES
Western Area Power Administration
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$ ---	$ ---
Subtotal, Budget Authority	---	---
Receipts and Reimbursements:		
Unobligated Balance, Start of Year	38,874	26,615
Unobligated Balance, End of Year	-26,615	-10,212
Power Revenue	85,141	110,311
Capital Transfer to General Fund	-4,000	-25,214
Total Obligations	$93,400	$101,500

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
COLORADO RIVER BASINS POWER MARKETING FUND
Western Area Power Administration
(In thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Western Area Power Administration - Colorado River Basins Power Marketing Fund	---	$-3,331	---	$-5,000	---	$-5,000
Total, Western Area Power Administration - Colorado River Basins Power Marketing Fund	---	$-3,331	---	$-5,000	---	$-5,000

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING

EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING

(In thousands of dollars)

	Fiscal Year 1983			Fiscal Year 1984		
Area and Utility	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Funds Required	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Appropriation Required
Billings Area (Continued)						
Montana Power Company	998	-762	236	1,248	-952	296
Nebraska Public Power District	1,758	-1,758	---	2,196	-2,196	---
Northern States Power Co.	772	-114	658	966	-144	822
Northwest Iowa Power Cooperative .	2,265	-1,798	467	2,831	-2,247	584
Northwestern Public Service Company	367	-100	267	337	-186	151
Missouri Basin Power Association .	867	-418	449	1,084	-523	561
Oliver-Mercer Cooperative	1	---	1	1	---	1
Omaha Public Power District	578	-506	72	723	-632	91
Ottertail Power Company	39	-28	11	49	-31	18
Cooperative Power Association	62	-62	---	78	-78	---

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

	Fiscal Year 1983			Fiscal Year 1984		
Area and Utility	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Funds Required	Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Appropriation Required
Billings Area (Continued)						
United Power Association	2,757	-227	2,530	3,446	-287	3,159
Mid-Yellowstone Cooperative	7	---	7	7	---	7
Minnesota Valley Electric Cooperative	21	-21	---	28	-28	---
Moreau Grand Electric Cooperative	12	-12	---	14	-14	---
Rosebud Electric Cooperative	12	-12	---	12	-12	---
Heartland Consumers Power District	113	-44	69	139	-44	95
Lincoln Electric System	386	-386	---	482	-482	---
Tri-County Electric Cooperative	2	---	2	2	---	2

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1983 Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Funds Required	Fiscal Year 1984 Gross Billing Purchase Power & Wheeling	Credit Due to Net Billing	Appropriation Required
Loveland-Ft. Collins						
Nebraska Public Power District	12	-12	---	12	-12	---
Pacific Power and Light Company .	45	-45	---	45	-45	---
Public Service Co. of CO	226	-66	160	226	-66	160
Tri-State G&T Assn., Inc.	885	-23	862	2,851	-28	2,823
Washakie Rural Electric Assn.	1	---	1	1	---	1
Wheatland Rural Electric Assn.	1	---	1	1	---	1
Basin Electric Power Coop.	876	---	876	2,869	---	2,869
Platte River Power Auth.	350	---	350	1,146	---	1,146
TOTAL	$70,445	$-12,277	$58,168	$82,402	$-14,402	$68,000

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Colorado River Basins Power Marketing Fund - Power Marketing - Western Area Power Administration Revolving Fund (CRB)

Under the Colorado River Basins Power Marketing Fund, Western's program is to implement national energy policy by providing reliable electrical service while optimizing energy conservation use and the development of renewable resources. Western operates and maintains approximately 3,000 miles of transmission lines and over 40 substations associated with the Colorado River Storage Project, the Colorado River Basin Project, and the Fort Peck Project. Western's operation and maintenance and power marketing expenses for these projects are financed from revenues collected by the Department of Energy. Power sales and other revenues collected in excess of expenses are used to pay interest and for repayment of investments. Wholesale power is provided to utilities over the interconnected high-voltage transmission systems. Long-term contracts provide for periodic rate adjustments to ensure that the administration recovers all costs of operation and all capital invested in power with interest in keeping with statutory requirements.

The authorities and role definitions for this program unit are contained in the Federal Reclamation law.

Accomplishments:

Accomplishments include:

- Energy sales for FY 1982 are 10.4 million megawatt hours annually and 10.7 megawatt hours in FY 1983; power revenues are estimated to be $148,079,000 in FY 1982 and $163,120,000 in FY 1983.
- About 2 to 3 million barrels of oil are conserved annually through the oil conservation program.
- A rate order increasing the firm power rate for the Colorado River Storage Project was issued during 1981.

Objectives:

The following specific objectives are planned for the FY 1984 to FY 1988 period:

- Market power with estimated total power revenues for FY 1984 of $171,534,000 and for the period FY 1985 through FY 1988 of $466,251,000. Energy sales are estimated to be about 11 million megawatthours in FY 1984 and 31.9 million megawatthours for FY 1985 through FY 1988.
- Conduct a fuel conservation program to yield an estimated savings of an equivalent of 2 to 3 million barrels of oil annually.
- Continue to reconstruct the Fort Peck-Havre 161-kV Transmission Line to be inservice by FY 1986.

FY 1984 Budget Request:

In FY 1984, Western will require obligational authority of $101,500,000. This program provides for continuing essential operation, maintenance, replacements, and power marketing programs for the Fort Peck Project; the Colorado River Basins Project, including the Central Arizona Project and the Navajo Project participating agreement; the Colorado River Storage Project and the Seedskadee Participating Project. The funding level includes increases for system replacements including polychlorinated-biphenyl replacement and disposal and supervisory control and data acquisition replacements and for increased maintenance and administrative and general expenses. These increases are partially offset by a decrease in the fuel conservation program activity due to revised estimates of Western's potential for participation in this program. Western's participation in the oil conservation program is continually reassessed to provide for optimum participation based on water supply conditions, availability of energy, transmission capabilities, changes in customer generating capabilities, and other factors. Additionally, this request includes $14,595,000 for continuation of reconstruction activities on the Fort Peck-Havre 161-kV Transmission Line in Montana.

The following tabulation and narrative compares the FY 1983 program to the FY 1984 requested obligational authority by major categories:

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
COLORADO RIVER BASINS POWER MARKETING FUND
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982	FY 1983	FY 1984 Base	FY 1984 Estimated Obligational Authority
Power Marketing - Colorado River Basins Power Marketing Fund (Western)				
Operation and Maintenance:				
Operating expenses - Obligational Authority	$93,400	$93,400	$93,782	$101,500
Subtotal	$93,400	$93,400	$93,782	$101,500
Offsetting collections: Applied power revenues used to offset operation and maintenance expenses	-93,400	-93,400	-93,782	-101,500
Subtotal	---	---	---	---
Total, Budget Authority	$ ---	$ ---	$ ---	$ ---
Staffing FTP/Total FTEs	208/220	208/220	208/220	210/222

Authorization: Sec. 302(a)(1)(E), P.L. 95-91 and various project authorizations.

Summary of Changes

FY 1983 obligational authority	$ 93,400
Built-in increases and decreases:	
Increase to Standard Level User Charge (rent) costs	+34
Increase to statutory pay cost increases	+300
Increase for Government share of Medicare	+68
Decrease in compensable workdays	-20
FY 1984 base	$ 93,782
Program increases and decreases:	
Decrease in purchase power and wheeling requirements primarily due to decreased fuel conservation program activity	$ -5,830
Increase for transmission system operation and maintenance costs including system replacements	+13,548
FY 1984 estimated obligational authority	$101,500

SYSTEM OPERATION AND MAINTENANCE
SUMMARY OF CHANGES IN REQUIREMENT FROM FY 1983 TO FY 1984
(In thousands of dollars)

Program Category	FY 1983 Obligational Authority	FY 1984 Obligational Authority Request	Increase (+) or Decrease (-)
Transmission System:			
Operation and Maintenance of Transmission Lines	$ 994	$ 2,486	$+1,492
Operation and Maintenance of Substations	2,658	3,848	+1,190
Operation and Maintenance of Communications Systems	768	922	+ 154
Subtotal - Transmission System	$ 4,420	$ 7,256	$+2,836
System Operation:			
Dispatching	$ 1,311	$ 1,849	$+ 538
Power Marketing	575	791	+ 216
Power Billing and Collecting	253	388	+ 135
Subtotal - System Operation	$ 2,139	$ 3,028	$+ 889
Ft. Peck Powerplant Generation Expense	$ 2,121	$ 2,450	$+ 329
Purchase Power and Wheeling	60,130	54,300	-5,830
Energy Conservation and Renewable Resources Program	147	341	+ 194
Administrative and General Expense	6,564	9,513	+2,949
Interest (accrued on investment)	3,048	3,208	+ 160
Replacements and Additions	14,831	21,404	+6,573
Total	$93,400	$101,500	$+8,100

Narrative Justifications:	FY 1984 Request
Transmission System	$7,256,000

This program activity provides for the system operation and maintenance expenses for approximately 3,000 miles of transmission lines, substations, and communication control system facilities. While there is no increase in the quantity of transmission lines or substations, there have been additions to existing substations which will be completed and require operation and maintenance in FY 1984. The operation and maintenance of the transmission system includes activities required to protect equipment and provide electric service to customers.

Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage levels, equipment to regulate voltages, relays for automatic protection, meters, and associated electrical equipment. Operation and maintenance duties performed in substations consists of switching to deenergize lines and equipment during emergencies, and maintenance of the electrical equipment. Transmission line maintenance includes ground and aerial line patrols for inspection. Also included is the maintenance of all transmission lines, consisting of maintenance of structures, insulators, conductors, overhead ground wires; access road maintenance; right-of-way maintenance; weed control; erosion control; and spray treatment of wood poles. Communication system maintenance will be performed on microwave equipment, radios, powerline carriers, telemetering, and other power system control equipment.

System Operation .... $ 3,028,000

This activity includes power system control and dispatching, power marketing, and power billing and collection activities.

Operation of power system control facilities includes the central control of the electric operation of the Federal transmission system; the operation of the central control and data acquisition computers at Western's power system control centers; the modification and maintenance of the operations related computers, computer terminal equipment, and computer programs; dispatching of power over the Federal transmission system; and coordinating the operation of the power system with other interconnected power systems.

Ft. Peck Powerplant Generation Expense .... $ 2,450,000

The increase in FY 1984 program is due primarily to the need to make repairs to powerplant surge tanks, install a powerplant central control system, rewind generators in Plant No. 1, and other nonrecurring powerplant maintenance required by the Corps of Engineers.

Purchase Power and Wheeling $54,300,000

The FY 1984 program request provides for purchase of energy to meet contractual commitments, participation in the fuel conservation program, and for wheeling expenses. The fuel conservation program under this activity is expected to increase income appreciably over expenses, as well as conserve oil and gas-fired generation. Approximately 2,000,000 barrels of oil are anticipated to be saved during the fiscal year. The decrease in purchase power and wheeling costs in FY 1984 is due to increased availability of surplus coal-fired capacity and energy in the area which reduces opportunity for participation in the fuel replacement program.

Energy Conservation and Renewable Resources Program ....$ 341,000

As of December 31, 1981, all contracts renegotiated with Western's customers require the customer's initiation of an energy conservation program. The FY 1984 request provides for modifying these customer contracts, and for furnishing support services and equipment such as anemometers to measure wind currents as a potential energy resource and thermal infrared scanners to detect structural heat seep.

Administrative and General Expense ....$ 9,513,000

This activity includes expenses for: executive management; direction of power management functional activities related to power supply and scheduling, power resources, and requirements; general system studies; customer service policy development; environmental analysis coordination; and public involvement activities. It also includes administrative support services consisting of budget, finance, personnel, safety, procurement, supply and office services, audit functions, computer support, legal counseling, and the expenses associated with these activities for the Western Headquarters, Area Offices, District Offices, and other field installations. The increase in the FY 1984 program is primarily a result of modernization of Western's power system operators training center, contract costs for power system audits, and upgrading of Western's ADP support system.

Interest ....$ 3,208,000

The program provides for interest accruing on power facilities of the Colorado River Storage Project.

Replacements and Additions $21,404,000

Replacements and additions are units of property which are required for system operations and reliability. The replacement and addition items which are provided for in the FY 1984 program are categorized as follows:

Transmission line rehabilitation ($14,595,000).

The request provides for continuing reconstruction and realignment activities for the Fort Peck-Havre 161-kV Transmission Line which serves as a link between the Fort Peck Powerplant and Western transmission systems in Montana. The 188-mile line was first energized in 1935 to serve construction power requirements at Fort Peck Dam. The line has no overhead ground wire, making it extremely vulnerable to lightning strikes, and has pole shell rot. Completion is scheduled in the fall of 1985 with planned inservice date in FY 1986.

Replacements and Additions (Continued)

Substation rehabilitation ($625,000).

This program provides $30,000 for replacing the existing wooden bus structures at Tiber Substation, Montana, with steel structures. The existing structures are in poor condition due to rot and constitute a fire hazard. The program also includes installation of two 115-kV oil circuit breakers at O'Fallon Creek Substation and for installation of a 161/115-kV autotransformer at Havre Substation to ensure system reliability for increased capacity related to the Fort Peck-Havre Transmission Line upgrade.

Substation Equipment ($1,383,000).

The program provides $150,000 for replacement of circuit breakers at Havre and Nashua Substations, $128,000 for replacement of obsolete oscillographs at Flaming Gorge and Glen Canyon, for continuation of the polychlorinated biphenyl replacement program, and for various electrical equipment which requires replacement. The request also provides $50,000 for breaker replacement at Archer Substation, in Wyoming, to insure reliable performance, $60,000 for replacement of the station annunciator at Ault Substation, and $268,000 for air dryers and switching equipment at Flagstaff Substation.

Mobile Equipment ($687,000).

This request will provide for one sedan, 20 trucks, one all-terrain vehicle, a sweeper, a forklift, $86,000 for transformer oil processing equipment, $219,000 for a tractor crawler, and various other miscel laneous mobile equipment required in maintaining the power system. The equipment must be replaced in accordance with GSA standards for age and/or mileage or because of the unavailability of repair parts.

Communication and control equipment ($3,812,000).

This FY 1984 program request will provide $2,997,000 for the acquisition of a supervisory control and automatic data acquisition system to replace an aging, obsolete and inadequate system installed in the Montrose, Colorado, District Office in 1962, and $161,000 for power center maintenance pending the new system installation. The request also provides for the replacement of UHF/VHF radio equipment necessary to improve power system reliability, for replacement of telemetering equipment, magnetic tape chart recorders, and other miscellaneous communications equipment.

Maintenance facilities ($140,000).

This request provides for a vehicle and parts building in Fort Peck, and Havre, Montana, needed to provide inside storage for security purposes and to improve emergency response time during periods of bad weather.

Tools and work equipment ($162,000).

This program provides for the replacement and acquisition of various test equipment, tools, shop, garage, and office equipment needed to operate and maintain power systems.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Key Activity Summary
Western Area Power Administration
Colorado River Basins Power Marketing Fund
(In thousands of dollars)

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Operations and Maintenance	Conduct ongoing operation and maintenance activities on three projects involving about 3,000 miles of transmission lines and associated facilities.	Continue ongoing operation and maintenance activities including testing and replacing deteriorating line structures.
	Perform power system control and dispatching; power marketing, billing and collecting; conservation and renewable resource development activities; and provide for other administrative and general expenses.	Continue power system control and dispatching functions, power marketing billing and collecting, conservation and renewable energy program activities and increased administrative and general expenses including funding to move and improve the Power Operations Training Center, installation of an Interactive Graphics System and Laboratory and other ADP hardware, and contracting for engineering and support services and equipment and aircraft maintenance.
	Provide power system replacements and additions, including substation, mobile, and communication and control equipment. Complete installation of major substation equipment at several locations.	Continue acquisition of power system replacements, including hardware for the Supervisory Control and Data Acquisition System.
	Provide for Corps of Engineers expenses at Fort Peck Powerplant.	Provide for Corps of Engineers increased maintenance expenses at Fort Peck Powerplant.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Key Activity Summary
Western Area Power Administration
Colorado River Basins Power Marketing Fund
(In thousands of dollars)

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Operations and Maintenance	Provides for: purchase energy requirements to meet contractual commitments; participation in the fuel replacement program; wheeling expenses; and interest accruing on the facilities of the Colorado River Storage Project.	Provides for: purchase energy requirements to meet contractual commitments; a decreased level of participation in the fuel replacement program; wheeling expenses; and interest accruing on the facilities of the Colorado River Storage Project.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Emergency Fund, Western Area Power Administration

For the "Emergency Fund", as authorized by the Act of June 16, 1948 (43 U.S.C. 502), to remain available until expended for the purposes specified in that Act, $500,000, on a continuing basis to be recovered from the Reclamation Fund against receipts for the transmission and sale of electric power and energy which are deposited into the Treasury through Western Area Power Administration which shall be available for transfer to the Western Emergency Fund: Provided, That expenditures from the Western Emergency Fund shall be replenished from project power revenues for which funds were expended on an emergency basis.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
EMERGENCY FUND - Western Area Power Administration - OPERATING EXPENSES
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$337	$500
Subtotal, Budget Authority	$337	$500
Receipts and Reimbursements:		
Unobligated Balance, Start of Year	$371	$---
Unobligated Balance, End of Year	---	---
Total, Obligations	$708	$500

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
Western Area Power Administration - EMERGENCY FUND
(In thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Emergency Fund	$500	$ 71	$337	$337	$500	$500
Total	$500	$ 71	$337	$337	$500	$500

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Emergency Fund, Western Area Power Administration

The goal of the Emergency Fund Program is to ensure continuous operation of Western's electric power transmission system and provide reliable, uninterrupted electric power service to customers in the event of an unusual or emergency situation.

Prior fiscal years accomplishments:

- Emergency power system repairs were made in FY 1980 and FY 1981 to transmission line structures damaged by floods in the Phoenix, Arizona, service area.

- Repairs were made to eight double-circuit steel transmission towers on the 230-kV Fort Thompson-Fort Randall Transmission Line in South Dakota, damaged by a tornado in FY 1980.

- Repairs were made to two wood-pole transmission towers on the 69-kV Custer-Devaul Transmission Line in North Dakota, damaged by a tornado in late FY 1981, and to Mead Substation appurtenances in Nevada, damaged by heavy rains in FY 1981.

- Repairs were made to transmission facilities located between Fargo, North Dakota, and Morris, Minnesota, damaged by a tornado during FY 1982.

- Emergency replacement work was required on a transformer at Gering Substation in Nebraska that was damaged by lightning in June 1982.

- Repair work was completed on six transmission line structures associated with the Jamestown-Grand Forks 115-kV Transmission Line in north central North Dakota and the Grand Forks-Largo 115-kV Transmission Line. Both lines were damaged by severe thunderstorms and high winds in July 1982.

In these instances, customer scheduled power deliveries were rerouted promptly and efficiently using other transmission facilities and no major outages were experienced.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
EMERGENCY FUND - Western Area Power Administration - OPERATING EXPENSES
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Emergency Fund (Western) Operating expenses ..	$500	$337	$337	$500
Total	$500	$337	$337	$500

Authorization: Section 1, P.L. 80-790

Summary of Changes

FY 1983 Appropriation enacted	$337
Built-in increases and decreases:	
No change	0
FY 1984 base	$337
Program increases and decreases:	
Increased funding to meet emergency requirements	+163
FY 1984 budget request	$500

The Emergency Fund Program is for purposes of defraying expenses incurred because of unusual or emergency conditions such as damage to transmission lines or other physical failures or damages, acts of God, or of the public enemy, fires, floods, drought, strikes or freight embargoes, or conditions causing or threatening to cause interruption in operation of power systems.

The FY 1984 budget would provide, in most instances, for repairs by Western's work crews in the event of a single power system emergency. Appropriation language provides a method of financing to facilitate the repair process and eliminate the potential need for supplemental appropriations in event of emergencies with repair costs in excess of $500,000.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Key Activity Summary
Western Area Power Administration
Emergency Fund
(In thousands of dollars)

KEY ACTIVITY	ESTIMATED FY 1983 ACTIVITIES	PLANNED FY 1984 ACTIVITIES
Reserve for Emergency	Ensure continuous operation of Western's electric power transmission system. ($337)	Ensure continuous operation of Western's electric power transmission system. ($500)

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

DEPARTMENTAL ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Departmental Administration

For salaries and expenses of the Department of Energy necessary for departmental administration and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the hire of passenger motor vehicles and official reception and representation expenses (not to exceed $35,000); $141,872,000, to remain available until expended, together with $209,619,000 to be derived from miscellaneous revenues and such additional amounts from miscellaneous receipts as necessary to provide a level of $351,491,000.

Explanation of Change

FY 1983 Continuing Resolution did not provide specific appropriation language for this account, therefore, new language is proposed for FY 1984.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DEPARTMENTAL ADMINISTRATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	1	1	1
EXECUTIVE LEVEL IV	11	6	4
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL	15	10	8
ES-6	11	7	6
ES-5	25	18	18
ES-4	91	66	65
ES-3	36	28	26
ES-2	27	22	19
ES-1	27	14	14
SUBTOTAL	217	155	148
GS-18	1	1	1
GS-17	3	3	3
GS-16	2	1	1
GS/GM-15	449	360	304
GS/GM-14	590	492	419
GS/GM-13	742	656	553
GS-12	414	349	296
GS-11	211	172	137
GS-10	15	10	5
GS-9	225	178	140
GS-8	117	83	68
GS-7	346	273	228
GS-6	292	223	177
GS-5	260	221	172
GS-4	101	86	64
GS-3	22	22	14
GS-2	3	1	1
GS-1	2		
SUBTOTAL	3,795	3,131	2,583
UNGRADED	56	34	29
TOTAL PERMANENT POSITIONS	4,083	3,330	2,768
UNFILLED POSITIONS, END OF YEAR	55		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	4,028	3,330	2,768

Department of Energy
FY 1984 Congressional Budget Request
Amounts Available for Obligations
Departmental Administration
(In Thousands of Dollars)

	1983	1984
Appropriations................................	$379,902	$141,872
Comparative Transferred To:		
Federal Energy Regulatory Commission.........	-3,300	
Energy Supply Research & Development.........	-36,715	
General Science Research & Development.......	-272	
Uranium Enrichment.........................	+25,000	
Miscellaneous Revenues - Dept. Admin.........	-142,541	
Subtotal................................	-157,828	-
Subtotal Budget Authority..................	222,074	141,872
Receipts and Reimbursements:		
Unobligated Balance Start of Year...........	+46,271	52,572
Unobligated Balance End of Year.............	-52,572	-52,572
Total, Obligations......................	$ 215,773	$141,872

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

DEPARTMENTAL ADMINISTRATION

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Office of the Secretary	2,093	1,225	927
Board of Contract Appeals	312	307	341
General Counsel	15,056	13,422	11,809
Inspector General	12,935	12,920	14,670
Management and Administration	137,435	131,652	116,207
A/S for Congressional, Intergovernmental and Public Affairs	7,199	6,657	3,400
PMA Coordination	956	956	517
Operations Offices	82,205	93,061	77,455
Minority Economic Impact	1,916	1,962	1,674
Policy Analysis and System Studies .	14,716	9,589	5,734
International Affairs	4,872	3,366	2,566
Cost of Work for Others	47,614	109,265	116,191
Continuing Resolution Unapplied (PACE)	—	13,233	—
Miscellaneous Revenues	-142,700	-175,541	-209,619
Total, Departmental Administration .	184,609	222,074	141,872

Departmental Administration

Overview

Departmental Administration includes general management and support activities benefiting all elements of the Department of Energy. The 1984 Budget reflects savings in certain overhead functions as a result of the planned merger and the reduction of many specific energy programs. As brief summary of each of the organizations is as follows:

Assisstant Secretary for Management and Administration provides salaries, benefits, travel and contractual services for the Departments' management and headquarters employees. The five multi-purpose operations offices manage and execute headquarters-delegated programs and projects.

Policy, Planning, and Analysis provides objective policy analysis and evaluation within the Department, and carries out studies mandated by Congress. Congressional, Intergovernmental, and Public Affairs develops and coordinates relations and with Congress; news media; State, Territorial, Tribal, and local goverments; other Federal agencies; consumer/citizen and business organizations; and the general public.

The General Counsel provides legal opinions, advice, and legislative drafting service to all Departmental programs except FERC. The Office of the Inspector General undertakes audits and inspections of energy activities and facilities to ensure compliance with the applicable laws and regulations and to guard against possible waste, fraud, and abuse. The Office of International Affairs is responsible for coordinating the development of international energy technology cooperation, developing policies for energy-related trade issues based on analyses of strategic and economic factors, developing and implementing international nuclear non-proliferation policies, and managing US participation in international energy emergency planning.

The Office of Minority Economic Impact determines how the Department's policies and actions affect minorities, develops programs to encourage and promote energy-related business for minority firms, attempts to improve minority participation in energy activities by providing loans to finance prospective minority contractors in preparing bid proposals. The Board of Contract Appeals resolves contract disputes between the Department and it contractors. The Office of the Secretary provides policy, clerical, and logistical support to the Secretary.

Power Marketing Coordination provides Headquarters administrative support to the Power Marketing Administrations.

Cost of Work for Others represents the full cost of products and services provided by the Department to qualified non-Departmental users. The Department collects revenues as offsets to the Cost of Work for Others program and in payment for other products and services provided.

Department of Energy
Departmental Administration
FY 1984 Congressional Budget Request
Office of the Secretary
Operating Expenses-Program Administration
(In Thousands of Dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Budget Request
Program Administration				
Program Direction	$2,093	$1,225	$1286	$927
FTE's	15/27	23/24	23/24	19/20

AUTHORIZATION: P.L. 97-35

Summary of Changes

Office of the Secretary
(Dollars in thousands)

FY 1983	$1,225
Built in increases:	
Pay cap	+ 21
Pay raise	+ 34
Medicare	+ 6
FY 1984 base	$1,286
Program decreases:	
Travel	- 25
Staffing of 4 fulltime equivalent	- 334
FY 1984 Budget Request	$927

Department of Energy
Departmental Administration
FY 1984 Congressional Budget Request
Office of the Secretary

Program Overview

The Office of the Secretary is responsible for the direction and supervision of energy research and development activities including nuclear, non-nuclear, environmental, safety, health, and defense programs. This involves the administration of a large federal agency, coordinating complex and various related and non-related programs into a cohesive and unitized organization.

Narrative Justification

A staff of 19 FTP/FTE and 1 OTFTP/FTE is required to assist in directing and supervising the energy programs and in presenting clear and concise guidance on energy research and technology issues. This staff provides the necessary expertise to aid in reaching decisions in controversial areas of energy. The outcome of these decisions directly affect the American consumer and other energy users.

Department of Energy
FY 1984 Congressional Budget

Lead Table
Board of Contract Appeals

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Appropriation
Board of Contract Appeals...	312	307	341	341
FTES......................	5/8	6/8	6/8	6/8

AUTHORIZATION P.L. 95-563

Summary of Change
Board of Contract Appeals
(Dollars in Thousands)

Fiscal Year 1983 Appropriation	$307
Built In Increases:	
Pay Raise..	9
Employer's Share of Medicare Health Insurance...........	3
Pay Cap	22
Fiscal Year 1984 Base.................................	341
Program Increases or Decreases: - None	
Fiscal Year 1984 Budget Request.........................	$341

Department of Energy
FY 1984 Congressional Budget
Program Overview
Board of Contract Appeals

The Board of Contract Appeals resolves contract disputes between the Department and its contractors in a quasi-judicial manner. This function is performed pursuant to the Contract Disputes Act of 1978. In addition, the Board, by delegation of authority from the Secretary, acts specifically as: the Contract Adjustement Board on applications for extraordinary contractual relief under Pub. L. 85-804; the Invention Licensing Appeals Board on appeals involving the patent rights of the Department; the Financial Assistance Appeals Board on disputes involving grants, cooperative agreements, loan guarantees and other financial assistance arrangements; and the Patent Compensation Board pursuant to the Atomic Energy Act of 1954. The Board may also act to resolve other quasi-judicial matters as assigned by the Secretary.*

Narrative Justification

The purpose of the Board may be categorized as follows:

a. Serving the needs of the Department for a good and effective working relationship between the Department and its contractors, grantees, licensees, etc., by providing an impartial forum for inexpensive and speedy resolution of disputes.

b. In a quasi-judicial manner, providing a means for coordinating those actions taken by its officials which result in factual or legal disputes -- befores a disputes is appealed to a court of law.

c. Conserving both Department resources and other public and private resources by reducing the need for litigation before the Federal courts.

d. Assisting in maintaining the credibility of the Department through a Board chartered to provide impartial, fair resolution of disputes.

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* Conducting environmental hearings; deciding appeals involving suspension, termination, or debarment; and appeals involving the Contract Work Hours and Safety Standards Act.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
General Counsel
Departmental Administration - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Program Direction				
Operating Expenses				
Personnel Expenses	$14,140[1]	$12,316[2]	$13,009	$10,456
Support Funding	916	1,106	1,106	1,353
Subtotal	$15,056	$13,422	$14,115	$11,809
Total				
Operating Expenses	$15,056	$13,422	$14,115	$11,809
Staffing				
FTP/Total FTEs	360/373[3]	223/241	223/241	216/226

Authorization: DOE Act, Pub. L. 95-91

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[1] Includes $2,360,000 for Regional Counsel
[2] Includes $236,000 for Regional Counsel
[3] Includes 61 FTEs utilized by Regional Counsel

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
General Counsel
(In thousands of dollars)

FY 1983 Appropriation enacted	$13,422
Built in increases and decreases:	
Pay raise	+457
Paycap changes	+149
Medicare	+ 87
FY 1984 base	14,115
Program increases and decreases:	
Personnel expenses	
o Decrease in personnel related expenses as a result of reduced staffing.	-2,553
Support funding	
o Increase in support funding for patents activities, law library operation, training, transcripts and related legal services.	+247
FY 1984 budget request	$11,809

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

General Counsel

The mission of the General Counsel is to provide legal opinions, advice and services in a timely manner to all of the Department's activities except the Federal Energy Regulatory Commission (FERC).

FY 1982 accomplishments include:

- Provided legal support to administrative and program offices.
- Conducted administrative and judicial litigation.
- Provided legal advice and support for enforcement, regulatory oversight and related activities.
- Ensured consistency and legal sufficiency of departmental regulations and proposed legislation affecting the Department.
- Administered and monitored employee conduct program activities.
- Conducted the Department's patents program.
- Exercised oversight of the Department's intelligence activities.

Specific objectives for FY 1984 to 1987 are:

- To provide legal support and advice to the Department's defense and nuclear energy programs, including matters such as waste disposal, facility licensing, nuclear non-proliferation, and safeguards and international agreements. Also, to provide support on nuclear international research and development agreements.
- To provide legal review, support and advice in regard to environment, health and safety.
- To provide legal support, including regulatory oversight, legislation coordination, and litigation, to all initiatives of the Secretary, Deputy Secretary, the Under Secretary and the Assistant Secretaries with respect to program reformulations, terminations, cancellations and other adjustments designed to implement the President's budgetary and regulatory reform goals.
- To review, monitor and coordinate the regulatory processes of the Department in order to promote regulatory reform.
- To provide legal support to the Department's procurement and financial program activities to include contracts, cooperative agreements, grants, loan guarantees and other types of financial instruments. This also includes related legal services to the Department's defense, research, conservation, and fossil energy program activities.

- To provide legal support and advice in the Department's program areas pertaining to Strategic Petroleum Reserves and to Naval Petroleum and Oil Shale Reserves.
- To provide legal support to the Department's emergency preparedness and contingency planning activities.
- To provide legal support for international non-nuclear energy program areas, including the IEA and oil imports.
- To provide legal support to the Department's natural gas program activities, including importation/exportation matters and presentations to the FERC.
- To render legal advice with respect to energy mineral leasing issues of interest to the Department.
- To provide legal support and advice to the Department's utility activities and to represent the interests of Department facilities as purchasers and consumers of energy in proceedings before State utility commissions and the FERC.
- To provide legal counsel and services regarding implementation of the Fuel Use Act (FUA).
- To provide legal support to the Department's energy conservation and renewable energy programs and activities.
- To provide legal support and advice respecting the Federal Power Marketing program.
- To provide legal advice, services and support to the Department's internal management activities, including counseling in connection with matters arising under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act, as well as matters involving EEO, fiscal administration, delegation of authority, personnel, tort claims and investigations of the Inspector General.
- To conduct the Department's intellectual property program to preserve its interest in patents, trademarks, and other intellectual property.
- To provide legal support and services in the coordination and clearance of legislative matters in the Department.
- To establish and administer the Department's employee conduct programs including requirements arising from the DOE Organization Act and the Ethics in Government Act.
- To effect oversight of the Department's intelligence activities.
- To support the Department of Justice (DOJ) in all litigation involving the Department's programs and actions other than the Emergency Petroleum Allocation Act (EPAA) and to defend against claims of injury from radiation involving Department programs.
- To render legal support to the Department's pre-litigation enforcement efforts under the EPAA.

- To provide legal services incident to investigations of individuals and companies suspected of violations (including willful violations) of the Mandatory Oil Price and Allocation Regulations and to refer appropriate cases to DOJ.

- To litigate all remaining meritorious enforcement actions arising under the EPAA before the Office of Hearings and Appeals and the FERC.

- To litigate meritorious enforcement actions under EPAA through civil proceedings in Federal courts directly where the Department has primary litigation responsibility and in conjunction with DOJ in cases where DOJ has primary responsibility.

Accomplishment of the foregoing objectives will ensure the Department's programs and activities are conducted in accordance with law. As a consequence, the interests of the government and the public will be preserved in the fulfillment of the nation's energy program goals.

Narrative Justification

In order to provide adequate legal opinions, advice and services in a timely manner to all of the Department's activities (except FERC), the General Counsel requires $11,809,000 to discharge the full range of assigned responsibilities during FY 1984. This amount represents a 22 percent decrease in total funds compared to levels authorized in FY 1982 and a 33 percent decrease in total funds compared to levels authorized in FY 1981. These decreases are largely a result of reduced requirements for legal support due to cut backs in various energy program areas. The funds requested for FY 1984 are required solely to sustain operations and to support legal program activities at the headquarters level. The funds requested for FY 1984 are expected to be utilized as described below:

Personnel Expenses - The request includes $10,456,000 for salaries and expenses. These funds are required for personnel compensation and benefits and travel for a staffing level of 226 total FTE's.

The General Counsel's expected utilization of the resources requested and the benefits derived from such funds are more specifically explained and justified below:

Deputy General Counsel for Programs - Of the total request, approximately 36 total FTE's or 16 percent will be utilized to provide direct legal support to the Department's various program areas. These resources will be needed to discharge legal support functions or perform tasks directly pertaining to:

- The Department's defense and nuclear energy programs, including matters such as waste disposal, nuclear non-proliferation, and safeguards and international agreements. Also, included in this area is legal work on nuclear international research and development agreements (10 FTE).
- Environment, health and safety (9 FTE).
- Department utility activities and representation of Department facilities in proceedings before State utility commissions and FERC (5 FTE).
- Federal Power Marketing program activities (3 FTE).
- Department energy conservation and renewable energy programs and activities (7 FTE).
- Management, supervision and coordination of the activities assigned to the Deputy General Counsel for Programs (2 FTE).

Deputy General Counsel for Legal Services - Approximately 78 total FTE's or 35 percent of the resources requested will be allocated to the Deputy General Counsel for Legal Services for the conduct of assigned programs and for rendering legal support, advice and services to the Department in areas directly pertaining to:

- Internal management activities, including counseling in connection with matters arising under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act, as well as matters involving EEO, fiscal administration, delegation of authority, personnel, tort claims and investigations of the Inspector General (12 FTE).

- Conduct of the Department's intellectual property program to preserve it's interest in patents, trademarks, and other intellectual property (21 FTE).
- Coordination and clearance of legislative matters of concern to the Department (14 FTE).
- Department procurement and financial program activities to include contracts, cooperative agreements, grants, loan guarantees and other types of financial instruments. This also includes related legal services to the Department's research and fossil energy program activities (23 FTE).
- Establishment and administration of the Department's employee conduct programs arising from the DOE Organization Act and the Ethics in Government Act and to provide for oversight of the Department's intelligence activities (6 FTE).
- Management, supervision and coordination of functions and activities assigned to the Deputy General Counsel for Legal Services (2 FTE).

Deputy General Counsel for Regulation - Approximately 24 total FTE's or 11 percent of the resources requested will be needed to discharge functions or perform tasks falling within the organizational area of responsibility of the Deputy General Counsel for Regulation. (Note: Consideration is being given to reorganizing and reassigning activities under this heading.) It is anticipated these resources will be utilized to provide legal support and services directly pertaining to:

- Strategic Petroleum Reserves and Naval Petroleum and Oil Shale Reserves; emergency preparedness and contingency planning activities; and international non-nuclear energy program areas, including the IEA and oil imports (12 FTE).
- Natural gas activities and energy mineral leasing issues of interest to the Department (4 FTE).
- Fuel Use Act (FUA) programs administered by the Department (3 FTE).
- The review, oversight and coordination of the regulatory processes of the Department (3 FTE).
- Management, supervision and coordination of legal activities assigned to the Deputy General Counsel for Regulation (2 FTE).

Deputy General Counsel for Enforcement and Litigation - Approximately 80 total FTE's or 35 percent of the total request will be needed for legal responsibilities assigned to the Deputy General Counsel for Enforcement and Litigation. These resources will perform tasks or discharge legal support functions directly pertaining to:

- Department pre-litigation enforcement efforts (5 FTE).
- Evaluation of allegations of willful violation of the Mandatory Oil and Price Allocation Regulations, referral of appropriate cases to DOJ, and support of prosecutive activities of DOJ on referred cases (5 FTE).

- Litigation in conjunction with the DOJ involving challenges to the Department's non-regulatory programs and actions (17 FTE).
- Enforcement actions arising under the EPAA before the Office of Hearings and Appeals and FERC (8 FTE).
- Enforcement actions under the EPAA through civil proceedings in Federal Courts directly where the Department has primary responsibility and in conjunction with DOJ in cases where DOJ has primary responsibility (43 FTE).
- Management, supervision and coordination of the activities assigned to the Deputy General Counsel for Enforcement and Litigation (2 FTE).

Other FTE Resource Requirements - 8 FTE's will be required for the provision of sustained administrative support and services such as financial management, personnel, etc., including the operation of a law library.

Support Funding - Of the total request, $1,353,000 is needed to cover estimated costs for GC's domestic and foreign patents activities ($1,107,000); law library operations and related activities ($162,000); legal transcript services and the publication of other legal documents ($66,000); and training ($18,000).

The increase in support funding is mainly due to increases in domestic patent and trademark office filing and issue fees which are mandated by statute. (Pub. L. 97-247).

The support funds requested will enable GC to conduct a viable patent program; to operate and maintain an adequate law library; to obtain transcripts and related legal documents which are a necessary part of casework; and to fulfill its training responsibilities.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Office of Inspector General

The overall goal of the Office of Inspector General (OIG) is mandated in Public Law 95-91. Section 208 (b) of this law delineates our goal as follows:

(b) It shall be the duty and responsibility of the Inspector General -

(1) to supervise, coordinate, and provide policy direction for auditing and investigative activities relating to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud and abuse in, programs and operations of the Department;

(2) to recommend policies for, and to conduct, supervise, or coordinate other activities carried out or financed by the Department for the purpose of promoting economy and efficiency in the administration of, or preventing and detecting fraud and abuse in, its programs and operations;

(3) to recommend policies for, and to conduct, supervise, or coordinate relationships between the Department and other Federal agencies, State and local governmental agencies, and non-governmental entities with respect to (A) all matters relating to the promotion of economy and efficiency in the administration of, or the prevention of fraud and abuse in, programs and operations administered or financed by the Department, and (B) the identification and prosecution of participants in such fraud or abuse;

(4) to keep the Secretary and the Congress fully and currently informed, by means of the reports required by subsection (c) and otherwise, concerning fraud and other serious problems, abuses, and deficiencies relating to the administration of programs and operations administered or financed by the Department, to recommend corrective action concerning such problems, abuses, and deficiencies, and to report on the progress made in implementing such corrective action; and

(5) to seek and coordinate his actions with the actions of the Comptroller General of the United States with a view to avoiding duplication.

Audits

The OIG Office of Audits functions as the internal auditing arm for the Department. As such, it performs expanded scope audits in each of the three areas (e.g., Financial and Compliance, Economy and Efficiency, and Program Results) as defined by the government audit standards established by the General Accounting Office. The Office of Audits' major goal is the prevention of waste, fraud, and mismanagement by performing independent evaluations of the Department's operating and administrative programs including, among other things, an assessment of the Department's financial and management control systems and procedures. Recommendations are made to correct any disclosed weaknesses, such as internal control weaknesses, that, if left unattended, could lead to waste, fraud and mismanagement. Detection of waste, fraud, and mismanagement is an important but secondary goal for the Office of Audits and is generally performed on request as an assist to the OIG Office of Investigations.

Inspections

The mission of the OIG Office of Inspections is to conduct independent and objective evaluations of the Department's dollar intensive scientific and technical programs and operations. The purpose of these evaluations is to ensure that these programs and operations are being managed in an economical and efficient manner consistent with stated program objectives.

Investigations

The mission of the Office of Investigations is to supervise, coordinate, and provide direction for investigative activities relating to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud or abuse in programs and operations of the Department.

OIG FY 1983 Accomplishments

The Office of Audits expects accomplishments for FY 1983 as follows:

(a) We have planned to initiate and/or complete 70 different audits in the areas of financial and compliance, economy and efficiency, and program results. In addition, we will spend nearly 3000 staff days on contract auditing and nearly 1400 staff days on grant auditing.

(b) We expect dollar savings to accrue to the Government as the result of our efforts by a ratio of $7 for each $1 expended.

(c) We anticipate improved efficiency in operations as the result of beginning to develop standard audit programs, training programs, and increased emphasis on ADP activity. We also expect; through more efficient planning and control, a responsive management information system, and office automation; that our audits will be more timely. We expect improved time frames for audits and greater results accruing to the Government in dollar savings in areas such as cash management.

The Office of Inspections expects the following accomplishments:

Research and development inspections	4
Design and construction inspections	5
Production and operations inspections	5
Special requirements inspections	12
Follow-up inspections	5

The Office of Investigations expects the following accomplishments:

Investigative cases closed	180
Investigative cases referred to prosecutive authorities	72

Investigative cases resulting in administrative actions	20
Investigative cases recommending programmatic correction	10
Investigative cases resulting in monetary recoveries	12
Investigative cases which dispose of allegations	66

Objectives for FY 1984 to 1987 1/

	Fiscal Years			
	1984	1985	1986	1987
Financial and compliance audits	13	14	15	17
Economy and efficiency audits	19	21	23	25
Program results audits	5	6	6	7
Contract audits	48	53	58	64
Federal assistance program audits	49	54	59	65
Research and development inspections	4	4	4	4
Design and construction inspections	5	5	5	5
Production and operations inspections	5	5	5	5
Special requirements inspections	12	12	12	12
Follow-up inspections	5	5	5	5
Investigative cases closed	180	198	218	240
Investigative cases referred to prosecutive authorities	72	80	88	96
Investigative cases resulting in administrative actions	20	22	24	27
Investigative cases recommending programmatic correction	10	11	12	13
Investigative cases resulting in monetary recoveries	12	13	15	16
Investigative cases which dispose of allegations	66	73	80	88

Benefits:

Accomplishment of the objectives will promote economy and efficiency in the programs and operations of the Department. Cost savings as a result of audits are expected to increase to $8 savings for each audit dollar spent.

1/ The Office of Audits is conducting an intensive study of the audit needs of the Department for FY 1985. The results of this study will influence the degree of effort expended in the different types of audits and the direction and approach to the various programs and operations within the Department for 1985 and later years.

The Office of Investigations' increase in productivity is based upon training of supervisors and investigators for improvement in case processing.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
LEAD TABLE

Office of Inspector General
(Dollars in thousands)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Inspector General	$12,935	$12,920	$13,244	$14,670
FTEs	146/153	151/159	151/159	172/180

AUTHORIZATION: Section 208, Public Law 95-91

SUMMARY OF CHANGES

(Dollars in thousands)

FY 1983 Appropriation	$12,920
Pay Cost Supplemental	+ 268
Increase due to Medicare	+ 56
FY 1984 Base	13,244
Program Increases and Decreases:	
Increased support funding (principally for audits performed by DCAA for DOE)	+ 506
Salary and benefits for additional 21 FTEs	+ 920
FY 1984 Budget Request	$14,670

NARRATIVE JUSTIFICATION

AUDITS

The basic planning objective of the Office of Audits is to maximize the audit coverage to the Department within the resources provided. We performed an analysis of the audit needs of the Department and estimated the audit resources required to provide minimal audit coverage. Audit needs were identified as the auditable units and auditable dollars in five program categories, e.g., Financial and Compliance, Economy and Efficiency, Program Results, Contracts, and Federal Assistance (Grants). Support requirements were added to these categories. The Office of the Inspector General expects to spend a greater amount of future time on audits than on organizational matters now that our infra-structure is in place. Therefore, we factored in a substantial productivity increase for the budget year. The following table illustrates quite clearly what you get at the requested budget level:

Generic Audit Subject	Universe of Auditable Units	Approximate Auditable Dollars 1/	Estimated Audits to Be Completed	Estimated Audit Cycle	Optimum Audit Cycle
1. Financial and Compliance	197	21.6 Billion	13.1	15.0 Yrs.	3
2. Economy and Efficiency	1141	22.4 Billion	18.5	61.7 Yrs.	3
3. Program Results	203	27.2 Billion	5.0	40.6 Yrs.	2
4. Contract	615	5.7 Billion	47.5	12.9 Yrs.	1
5. Fed Assistance Program	13700	3.3 Billion	49.3	N.A.	N.A.

Auditing is cost effective when performed as part of a balanced audit effort. For Fiscal Year 1982, Audits made recommendations that will save $7 for each audit dollar expended. This Benefit-Cost ratio is based upon data on savings that OIG reported to the President's Council on Integrity and Efficiency. These dollar savings and the limited audit coverage shown on the above chart fully supports the requested funding for the OIG Audit function.

INSPECTIONS

The objective of the Office of Inspections is to improve efficiency and economy in the management of the Department's dollar intensive scientific and technical programs and operations. Our survey of these programs and operations showed that there are 69 major technical programs. Fifty-four are funded in the range of $50 million to $2.7 billion. The following inspection frequency should be achieved with the requested resources:

1/ Represents "gross" audit dollars (both revenue and expenses) rather than "net" dollars reflected in the budget. Also, dollars involved in one type of audit (e.g., Program Results) may overlap somewhat with dollars involved in another type of audit (e.g., Economy and Efficiency).

For R&D Programs and Production and Operations -

Annual B/A	Inspection Frequency
less than $100 million	do not inspect
$100 to $500 million	every third year
more than $500 million	every second year

For Major Construction Projects -

Total Estimated Cost	Inspection Frequency
less than $200 million	do not inspect
$200 million to $500 million	every third year
more than $500 million	every second year

We estimate that at the requested budget level we could initiate approximately 13 proactive and 18 reactive inspections.

INVESTIGATIONS

The objective of the Office of Investigations is to supervise, coordinate, and provide direction for investigative activities relating to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud or abuse in programs and operations of the Department.

At the requested level, Investigations will minimally be able to accomplish its requirements as mandated by Public Law 95-91. The budget request will maintain the current level of resources available to the Office of Investigations.

Management and Administration
FY 1984 Congressional Budget Request
Operating Expenses and Plant
and Capital Equipment

Management and Administration is the principal advisor on matters relating to: overall management and control of financial resources; organization and adminintrative management; personnel; procurement; federal assistance agreements and contracting and equal employment opportunity. In addition, Management and Administration provides Executive Secretariat services; direction for the Department's In-House Energy Management Program; and is responsible for technical information management.

The accounts within the purview of Management and Administration within this appropriation provide for the full range of management support for the Department and are carried out in the execution of the following functions:

- Provides direct administrative, financial, personnel and procurement support to the Secretary.
- Coordinates and develops personnel policies, standards, and guidelines for the department. Provides personnel support for Headquarters.
- Establishes and maintains organization and management policies and systems, manpower control and utilization policies and systems.
- Provides administrative support services for the Secretary and other elements of the Department. For Headquarters, this also includes the budgeting for direct costs of support services.
- Serves as Department Advisory Committee Management Officer.
- Plans, acquires, operates, and maintains Headquarters administrative automatic data processing facilities, services, and systems. Develops and oversees Departmental telecommunications and provides Headquarters with telecommunications services, computer hardware and software capabilities.
- Serves as the central point within the Department for planning, policy, budgeting and approval for ADP needs.
- Provides for the development and implementation of policies and procedures for real property management, site selection, site development planning, and site facility utilization.
- Provides policy guidance and procedures for Departmental contractor labor relations, including contractor manpower development and utilization, labor law compliance, collective bargaining, wage and salary administration, insurance, pension, and equal opportunity policy and programs.
- Formulates, presents and executes the budget of the Department.
- Directs the design, development, implementation, and control of management information systems.

- Develops and maintains a program of resource allocation, control, and reporting for the financial integrity and safeguarding of Departmental funds and property. Maintains and performs the necessary accounting functions to ensure that all funds of the Department are accurately accounted for.

- Establishes policy and procedures for administration of the Department's construction program. Provides direction, oversight, guidance and evaluation of construction programs, project planning, and execution.

- Serves as the principal staff advisor to the Secretary for the coordination and development of policies, standards and guidelines for the Federal equal employment opportunity programs.

- Enters into, extends and modifies contracts, (e.g., cooperative agreements, grants, loans, guarantees) extends and modifies agreements between the Department and other Governmental entities and settles terminations thereof; approves subcontracts and extensions, modifications, and settlement of termination thereof; and approves purchases by contractors and subcontractors.

- Establishes levels of procurement/contract/Federal assistance authority for the Department's organizations.

- Develops, issues, and maintains Department policies, standards, procedures, systems and plans pertaining to procurement and contracting aspects of acquisition, including procurement of construction and architect/engineer services, Federal assistance, and sales processes. Provides advice and assistance in the application of Department and and Federal acquisition, Federal assistance and sales policies, standards and procedures.

- Provides operational procurement and Federal assistance support to Headquarters elements.

- Develops, issues, and maintains Department policies, standards, procedures and systems pertaining to personal property management and to the Defense Production Act priorities and allocations program.

- Facilitates the receipt, routing, coordination, response, tracking, status reporting and dispatch of correspondence and other written documents addressed to or sent from the Secretariat.

- Facilitates the proper coordination and follow-up of the decision making process and provides information on the status of decisions made or pending before the Secretariat.

- Serves as the central Department repository for all official documents of the Secretary and as the institutional memory for key Department actions and decisions.

Department of Energy
FY 1984 Congressional Budget

Lead Table
Management and Administration

	FY 1982 Appro-priation	FY 1983 Appro-priation	FY 1984 Base	FY 1984 Budget Request
MANAGEMENT AND ADMINISTRATION				
Operating	$134,435	$129,367	$131,542	$112,307
Capital Equipment	3,000	2,285	2,285	3,900
Total	$137,435	$131,652	$133,827	$116,207
FTES	1232/1304	994/1104	994/1104	900/950

AUTHORIZATION P.L. 97-35

Department of Energy
FY 1984 Congressional Budget Request
Summary of Changes
Departmental Administration
Management and Administration
(Dollars in Thousands)

FY 1983 Appropriation	$131,652
Built In Increases:	
FY 1983 Pay Raise	+1,511
FY 1983 Pay Cap Adjustment	+345
Employer's Share of Medicare Hospital Insurance Tax...	+319
Fiscal Year 1984 Base	$133,827
Program Increases	
Travel	+194
Equipment..	+1,615
Program Decreases	
Contractual Services	-11,447
Salaries and Expenses..............................	-7,982
FY 1984 Budget Request	$116,207

FY 1984 Congressional Budget Request
Management and Administration

Narrative

Management and Administration accounts provide management policies and procedures; administrative services, procurement, automatic data processing, and communications; guidance and overview of contractor's salary and benefit programs; financial management and administration of all departmental equal opportunity activities. Funding request covers costs for full time and other than full time salaries, benefits, travel, and personnel support costs.

The major goals for Management and Administration are to identify and eliminate areas of waste, extravagance and costly administrative overhead, and at the same time promote increased efficiency and effectiveness in management and administrative support services.

	FY 1982 Appro.	FY 1983 Appro.	FY 1984 Budget Request
Management and Administration	$137,435	$131,652	$116,207

The FY 1984 Management and Administration request of $116,207,000 is a net decrease of $15,445,000 from the FY 1983 appropriation. The 1984 budget reflects savings in certain overhead functions as a result of the planned merger and the reduction of many specific energy programs.

Salaries and Expenses..........................$ 42,353.....$ 36,546

Includes estimates for full time permanent base salaries; other compensation, which includes base salaries for other than full time positions, reimbursement to other Government agencies for personnel loaned to the DOE, terminal leave and overtime; and benefits which cover expenses to the Civil Service Retirement and Disability funds, Employees Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, moving expenses, and Workman's Compensation. Also includes funding for distinguished and meritorious rank awards and performance bonuses for the Department as set forth under the Civil Service Reform Act of 1978.

Travel ....$ 1,706.... $ 1,900

Covers funding for official domestic and foreign travel, GSA motor pools and shuttle bus services.

Contractual Services ....$ 85,308.....$ 73,861

Provides for transportation of things, communications, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts for Headquarters.

Capital Equipment.............................$ 2,285.....$ 3,900

Provides for replacement of ADP and administrative equipment which has become unserviceable or on which further repairs would be uneconomical, purchase of equipment to upgrade computer memory and storage capacity, and purchase of equipment to support transmission of classified data.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Power Marketing Coordination
Departmental Administration Appropriation
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Power Marketing Coordination	$ 956	$ 956	$ 985	$ 517
Staffing: FTP/FTE	14/14	8/9	8/9	9/10

Authorization: P.L. 95-91

Summary of Changes

FY 1983 Appropriation	$ 956
Built-in increases:	
- Pay cost supplemental	+ 16
- Medicare	+ 4
- Pay cap	+ 9
FY 1984 Base	$ 985
Program decreases:	
- Crosscutting overhead support activities	-468
FY 1984 Budget Request	$ 517

Office of Power Marketing Coordination $517,000

The Office of Power Marketing Coordination is responsible for advising the Assistant Secretary for Conservation and Renewable Energy on all matters concerning power marketing. This Office is also responsible for coordinating and overseeing the operations of the five (5) power marketing administrations while recognizing and preserving their organizational independence. Power marketing organizations include the Alaska Power Administration, Bonneville Power Administration, Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration. The PMA's represent the major source of hydroelectric power in the geographical areas they service.

The Office also develops common procedures for the preparation of rate and repayment studies, processes power rate proposals, provides staff support for interim rate increases and other aspects of power sales. OPMC also serves as focal point on physical resources matters for all power marketing administrations, especially in relationship to states not now served by a power administration, and to national and international water resources organizations, and represents the United States on the Columbia River Treaty Permanent Engineering Board. It also coordinates and provides guidance on legislative proposals, budget presentations and authorizations, annual management operating plans, financial management matters, organizational structure, and other administrative affairs affecting all five (5) power marketing administrations within the structure of the Department of Energy. The Office serves as the Washington liaison for the Alaska, Southeastern and Southwestern Power Administrations.

The following illustrates some of the measurable functions performed by OPMC:

o Rate adjustments received, prepared and submitted	8-10 annually
o Studies of the impact of repayment policies, amortization policies, interest rates and other factors in the pricing of power	3 annually
o Cost allocation studies	12 annually
o Review of project reconnaissance and feasibility reports	40-50 annually
o Meetings on hydropower and electric transmission and distribution with foreign and domestic technical delegations	40-60 annually
o Water Resources Council and other water policy issue meetings	50-60 annually
o Response to Congressional, public inquiries	20+ weekly
o Customer meetings, public hearings	12 annually
o Major Power and Resource studies	1-2 annually
o Radio Spectrum Band meetings	12 annually
o Budget review and preparation	50 annually

Ongoing administrative and technical assistance duties carried out by this Office include:

- Coordinate the preparation and execution of budgets and program and management plans for power marketing organizations.

- Provide rate and repayment analysis and review. Insure repayment criteria of PMA's is met and interim rates are presented to the Assistant Secretary for signature.

- Initiate, develop and coordinate PMA-related legislative activities.

- Facilitate the interface between PMA's and other Federal (DOE and non-DOE) organizations.

- Furnish information on emerging technology areas of interest to the PMA's in coordinating the dissemination of transmission and renewable resource technology.

- Represent the Department of Energy on inter-agency water resources studies and task forces, especially those relating to the responsibilities of the Water Resources Council.

- Coordinate and review technical studies pertaining to power and water resources and electric power transmission.

- Review and approve project cost allocation studies and power aspects of individual water project studies.

In response to specific public laws affecting the power marketing administrations, the OPMC assists them to meet four primary objectives:

- Maximize the production and sale of hydroelectric power from Federal dams.

- Maintain a high degree of system reliability.

- Continue to provide the flexibility required to meet demands in the movement of power.

- Meet repayment criteria provided by law.

In order to meet these objectives, the following items illustrate some of the accomplishments achieved by OPMC in FY 1982:

- Staff appeared on behalf of the PMA's and DOE at four (4) Congressional hearings and prepared testimony for, or testified directly for the Department on matters relating to PMA budgetary authorization and appropriation hearings. In addition, testimony was prepared for several other hearings on specific issues or legislative oversight.

- Represented the United States on the Columbia River Treaty Permanent Engineering Board.

- Processed nine (9) rate adjustments affecting all five PMA's.

- Reported to the Assistant Secretary on annual PMA management plans, including quarterly status reports on PMA operations.

The FY 1984 request is primarily for salaries and expenses of 10 employees.

A staff total of 10 personnel, 6 professional and 4 support, are assigned in divisions responsible for water and power resources; rates, power contracts, and allocations; and budget and financial management, procurement, and administrative services.

Department of Energy
FY 1984 Congressional Budget

Lead Table
Operations Offices

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Appropriation
OPERATIONS OFFICES				
Operating	$81,592	$92,446	$95,776	$76,374
Capital Equipment	613	615	615	1,081
Total	$82,205	$93,061	$96,391	$77,455
FTES	1562/1703	1587/1746	1587/1746	1323/1457

AUTHORIZATION P.L. 95-91 SECTION 650

Department of Energy
1984 Congressional Budget Request
Summary of Change
Departmental Administration
Operations Offices
(Dollars in Thousands)

Fiscal Year 1983 Appropriation	$ 93,061
Built In Increases:	
Pay Cost Supplemental.................................	2,484
Employer's Share of Medicare Hospital Insurance Tax.....	510
Pay Cap..	336
Fiscal Year 1983 Base................................	96,391
Program Increases and Decreases:	
Reduction in Staff Years From 1746 to 1457....................................	-18,936
Fiscal Year 1984 Budget Request	$ 77,455

Department of Energy
1984 Congressional Budget Request
Program Overview

OPERATIONS OFFICES

The principal objectives of the 5 multi-purpose operations offices is to manage and execute Headquarter-delegated program/project responsibilities. The operations offices field role includes energy technology, defense programs, nuclear, basic and applied research and environmental programs.

The operations offices coordinate program, provide input to program formulation and policy, monitor and evaluate contractor performance, and provide day-to-day guidance to their contractors. Additional, the operations offices plan, develop and administer budgets and maintain an administrative staff to support on-going programs and projects.

NARRATIVE JUSTIFICATION

The five operations offices conduct research and development activities by applying engineering and scientific expertise to several aspects of the nuclear field; alternative energy applications, advanced energy systems, environmental and safety applications, programs supporting national security and defense programs. A general administration staff provides administrative and inter-program technical management of assigned programs and projects.

A total of $77,455,000 is requested to enable the five operations offices to provide for personnel and related support cost to manage and execute headquarter-delegated program/projects responsibilities.

	1983	1984
Salaries and expenses..............	$69,453,000	$55,434,000

Includes estimates for full-time permanent base salaries, other compensation, which includes base salaries for other than full-time positions, terminal leave, overtime, and benefits which cover expenses to the Civil Service Retirement and Disability. Employees Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, FICA taxes, moving expenses, and any benefits for former employees.

Travel............................	$ 2,000,000	$ 1,920,000

Covers funding for official domestic and foreign travel and minor amounts for GSA motor pools.

Contractual Services...............	$21,026,000	$19,020,000

Provides for transportation of things, communication, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts for the Operations Offices.

Capital Equipment..................	$ 615,000	$ 1,081,000

Provides for procurement of administrative equipment which has become unserviceable or on which further repairs would be uneconomical.

Contractual Services...............	$21,026,000	$19,020,000

Provides for transportation of things, communication, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts for the Operations Offices.

Capital Equipment..................	$ 615,000	$ 1,081,000

Provides for procurement of administrative equipment which has become unserviceable or on which further repairs would be uneconomical.

DEPARTMENT OF ENERGY

FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

OFFICE OF MINORITY ECONOMIC IMPACT
(In thousands of dollars)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
MI	$1,916	$1,962	$1,997	$1,674
Staffing FTP/TOTAL FTE's	12/14	12(11/1)	11(11/0)	11(11/0)

Department of Energy
FY 1984 Congressional Budget Request

SUMMARY OF CHANGES
OFFICE OF MINORITY ECONOMIC IMPACT
(In thousands of dollars)

FY 1983 Appropriation		$1,962
Built in increases and decreases:		
Pay cost supplemental	21	
Medicare	5	
Pay Cap	9	
		35
FY 1984 base		$1,997
Program increases and decreases:		
Program Funds		-300
Program Direction		- 23
Subtotal		$ -323
FY 1984 Budget Request		$1,674

DEPARTMENT OF ENERGY

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

OFFICE OF MINORITY ECONOMIC IMPACT

GOALS

The goals of the Office of Minority Economic Impact (MI) are to advise the Secretary on the impact of national energy policies, programs, and regulations on minorities; provide technical and management assistance to minority educational institutions and minority business enterprises to increase their participation in energy activities, and provide direct loans to minority businesses for development of proposals to the Department. MI will provide for the full coverage of the activities mandated by Section 614 of the National Energy Conservation Policy Act (Public Law 95-619, dated November 9, 1978).

FY 1983 ACCOMPLISHMENTS INCLUDE

Management and Technical Assistance for Businesses

- Initiated energy-related business opportunities program for minority business enterprises.
- Established a regional contractors program to provide guidance to minority businesses with specific objectives on energy-related procurement actions.
- Implemented cooperative developmental energy programs with energy industry, minority educational institutions and minority businesses.
- Expanded the scope of information in MI's Clearinghouse.
- Provided minority concerns on the Small Business Innovation Research Advisory panel.

Financial Assistance (loans) for Business

- Initiated a minority business updated capabilities file within the Department of Energy to facilitate loan processing procedures, and increased the volume of loans.
- Processed an amendment to Section 211(e) to Public Law 95-619.

- Revised 10 CFR 800 to amend the MI loan program regulations to allow second and third tier Department of Energy subcontractors to be eligible.
- Improved the marketing effort for the loan program to allow more minority business enterprises to participate in energy programs.

Management and Technical Assistance for Educational Institutions

- Expanded the country-wide vocational training in energy-related technologies.
- Improved and extended activities to implement the Historically Black Colleges and Universities White House Initiative, mandated by Executive Order 12320.

Research

- Updated the data base and improved the analytical capabilities of the Minority Energy Assessment Model.
- Improved the socio-economic and energy consumption data base for Native American Indians, Hispanics and Asian Americans.
- Extended the scope of analysis applied to local and regional data collected by MI.

Objectives of FY 1984 and 1988 are:

1. The primary objective of MI during FY 1984 to FY 1988 will be implementing and expanding our minority business development efforts.

   - FY 1984 -- Continue strategic planning and early implementation of FY 1983 initiatives.

   - FY 1985 -- Fully implement all initiatives that were begun in FY 1984.

   - FY 1986 -- Begin early evaluation of the fully implemented initiatives and program expansion as needed.

   - FY 1987 -- Continue evaluation of initiatives. Expand and implement programs based on the results of the evaluation analysis.

   - FY 1988 -- Evaluate and solidify the programs that have met the legislative mandate to assess the impact to determine continuation of need.

2. Another objective of MI during FY 1984 to FY 1988 will be directed to minority educational institutions.

   MINORITY VOCATIONAL TRAINING

   - FY 1984 -- (a) Continue the basic energy-related curricula (b) compile and evaluate early data on FY 1982-1983 graduates and (c) adjust the energy-related curricula for funding to eliminate those curricula that do not meet the needs of industry in the State, nor create job opportunities and add curricula that are more promising for job opportunities.

   - FY 1985 -- (a) Perform detailed analysis on job placement statistics country-wide (b) continue to increase student participation (c) continue to monitor and track graduates leaving the program and will start a new cycle with each new group of honor students and (d) continue to reassess and reevaluate energy-related curricula for increased job opportunities which will require close contact between MI and the colleges.

   - FY 1986 -- (a) Continue the vocational training program with some adjustments of adding and deleting certain energy-related curricula based on job placement experience and discussions with the colleges (b) continue to compile and assess data reported from the colleges on minority honor students in the FY 1983/1985 program and (c) make early cross-country curricula and job placement comparisons by identifying energy-related curricula that have the highest degree of success for job placement; identifying those that have a low job placement record; and identifying trends in developing new markets and curricula.

- FY 1987 -- (a) Continue to make cross-country curricula and job placement comparisons with more available data from the colleges and, (b) continue to compile and assess data reported from the colleges on minority honor students in the FY 1984/1986 program.

- FY 1988 -- Compile and assess all vocational institution data to determine the results of the minority honors program to date, and to make recommendations on a cost-benefit basis to decide the need to continue this program any further.

HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND EXECUTIVE ORDER 12320

National Laboratories and Cooperative Agreements

- FY 1984 -- Initiate activities for the use of DOE programs fund to improve the administrative infrastructures of the HBCUs by developing formal arrangements between the laboratories and the HBCUs.

- FY 1985 -- Increase by two the number of cooperative agreements with HBCUs. MI will continue to increase and expand the level of participation.

- FY 1986 -- Begin early evaluation of the previous agreements and add two additional cooperative agreements to the program.

- FY 1987 -- Continue to monitor the HBCUs capabilities and add two cooperative agreements to bring the total to ten.

- FY 1988 -- Evaluate and assess the entire program to determine the impact and compliance with Executive Order 12320.

HBCU Professors/Laboratory Scientists Exchange Programs

- FY 1984 -- Identify researchers at ten HBCUs desiring to enrich their skills and institutions in energy research and identify the DOE laboratory and laboratory researcher desiring to facilitate the enrichment.

- FY 1985 -- Match the HBCU scientists and institutions with the DOE laboratory and laboratory scientists and initiate the exchange process.

- FY 1986 -- Measure the direct benefits of the program to the laboratory and the HBCUs and increase the participation by one hundred percent.

- FY 1987 and FY 1988 -- Continue to monitor and assess the progress and benefits of the program to determine the necessity for further effort by MI.

Work Study Programs

- FY 1984 -- Developed plans for producing a significant representation of HBCU students from thirty percent of the HBCUs in the DOE student work experience programs at DOE facilities.
- FY 1985 -- Identify and match HBCU students with the appropriate DOE facility for work experience.
- FY 1986 -- Evaluate to measure the benefits to DOE and the HBCU and implement improvements and expansion of the program.
- FY 1987 and FY 1988 -- Continue program assessment and improvements to increase the quality and impact.

3. Another objective of MI during FY 1984 to FY 1988 will be in the Research Program area. MI will continue an on-going research program as mandated by our legislation.

   - To continue to advise the Secretary of Energy on the impact of energy policies on minorities and those who are on low and fixed incomes.
   - Conduct detailed evaluation of new energy programs, policies and regulations on minorities.
   - Expand the capability of its Minority Energy Information Clearinghouse system so as to provide data retrieval capability to identify (1) procurement opportunities within DOE (2) establish linkages to the DOE institutional plan and (3) energy capabilities within the Historically Black Colleges and Universities.
   - Expand the scope of information to include all minority categories. Refine and expand the end-use consumption data of various minority categories.
   - Update and evaluate data on average energy consumption and energy expenditures for minorities.
   - Establishment of an Interagency Working Group for research on minorities and energy.

Accomplishments of these objectives during FY 1984 to FY 1988 will enable MI to meet the statutory requirements of Public Law 95-619, and thereby enable minorities to contribute and participate more fully in the mainstream of the american economy.

DEPARTMENT OF ENERGY

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Policy, Planning, and Analysis

The Office of Policy, Planning, and Analysis (PPA) serves as a central policy office for the Department in that it provides the Secretary with an objective policy analysis and evaluation capability, coordinates energy related policy analyses conducted within DOE and the executive branch, and carries out studies mandated by Congress. The goals of PPA are to aid in the identification of major energy policy issues and develop an agenda for their resolution; create a foundation for better energy policy and programs through improved analysis and evaluation, and institutionalize the process of policy guidance and program development and review throughout the Department. These goals are carried out primarily through the use of PPA's staff, supplemented by energy experts in the private sector, universities, and national laboratories which provide highly specialized analytical skills to augment PPA's staff efforts.

PPA's significant recent accomplishments include:

- o Completion of studies mandated by Congress or requested by the Administration, such as
  - Title X (Sunset) review of the programs of the Department.
  - Analyses of Alternatives to the Natural Gas Policy Act.
- o Completion of the fiscal year 1984-1988 Strategic Program Planning cycle for the Department.
- o Creation, organization and conduct of the Electric Utility Policy Project.
- o Preparation of Cabinet Council Working Papers: Clean Water, PURPA, Nuclear Equipment Industry, Acid Rain, Fuel Use Act, OCS Leasing.
- o Analysis of Appliance Efficiency Standards.
- o Analysis of the Strategic Petroleum Size Study.

Specific objectives for FY 1984 to FY 1987, formulated in response to Public Law 95-91 are:

- o Analyses of topics of Congressional, Presidential, and Secretarial concern.
- o Maintenance of a conceptual framework for energy policy analysis and a strategic planning capability.

Accomplishment of the above objectives will support the continued development, analysis, and evaluation of specific policies and programs in response to Congressional, Presidential, and Secretarial mandates.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Policy, Planning, and Analysis
Departmental Administration - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Support Funding-OE	$ 8,923	$5,613	$5,613	$3,500
Program Direction-OE	5,793	3,976	4,265	2,234
Total Operating Expenses	$ 14,716	$9,589	$9,878	$5,734
Staffing FTP/Total FTE's	107/116	65/80	65/80	35/35

Authorization: Sec. 102, 203, 657, 801, P.L. 95-91

SUMMARY OF CHANGES

FY 1983 Budget Appropriation	$	9,589
Built in increases and decreases:		
Pay cap		+ 70
Pay cost supplemental		+192
Medicare		+ 27
FY 1984 base	$	9,878
Program increases and decreases:		
Policy Analysis and Systems Studies		
o Reduction due to reduced scope of policy studies		- 2,113
Program Direction		
o Decrease of 45 FTE's		- 2,031
FY 1984 Budget Request	$	5,734

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
Narrative Justification
Policy, Planning, and Analysis

The Office of Policy, Planning, and Analysis (PPA), successor to the Office of Policy and Evaluation (PE), was created pursuant to the DOE Organization Act of 1977 to provide leadership in development of integrated energy policies and programs and to coordinate a broad range of policy-related functions that cut across organizational lines. The Office serves as a central policy office for the Department in that it provides the Secretary with an objective policy analysis and evaluation capability, coordinates energy-related policy analyses conducted within DOE and the executive branch, and carries out studies mandated by Congress.

Goals and Objectives

The major goals of the Office of Policy, Planning, and Analysis are:

- To aid in the identification of major energy policy issues and develop an agenda for their resolution;
- To create a foundation for better energy policy and programs through improved analysis and evaluation; and
- To institutionalize the process of policy guidance and program development and review throughout the Department.

In support of the goals outlined above, the Office is pursuing the following major objectives:

- Analyses of topics of Congressional, Presidential, and Secretarial concern.
- Further development and implementation of a basic conceptual framework for energy policy analysis.

PPA uses its staff and outside contractors in pursuit of its goals and objectives. The conceptual development and framing of issues and analytical tasks, selection of methods of issue analysis, program evaluations and policy development and decisionmaking are activities performed by the PPA staff. These efforts are supplemented by energy experts in the private sector, universities, and national laboratories which provide highly specialized analytical skills not usually found in Government.

JUSTIFICATION FOR FY 1984 CONGRESSIONAL BUDGET REQUEST

The FY 1984 budget request for PPA is $5,734,000, a decrease of $3,855,000 from the FY 1983 appropriation. The requested funding for PPA will assist the Office in overseeing the analysis of policy issues, developing new policy initiatives, coordinating these initiatives within the Department, and monitoring the implementation of policy decisions within DOE. The funding is to be split between two program elements, Policy Analysis and Systems Studies and Program Direction.

Policy Analysis and Systems Studies

The FY 1984 Congressional budget request for Policy Analysis and Systems Studies is $3,500,000, a decrease of $2,113,000 from the amount budgeted in FY 1983. This request will provide studies and analyses for a limited set of major policy issues. Results from these studies are helpful and important to the development of energy policy.

A limited range of short-term studies and analyses will be conducted in FY 1984. These studies will provide objective, independent data and analyses relating to current energy issues. The analytical requirements mandated by the Congress, the President, and the Secretary will continue to receive the highest priority in the allocation of PPA's resources.

Program Direction

The FY 1984 request for program direction is $2,234,000, a decrease of $1,742,000 from the FY 1983 appropriation. This funding provides salaries, benefits and travel expenses for 35 FTE's, a decrease of 45 FTE's from the FY 1983 appropriated level. Also included in this request is an allowance for severance pay.

The primary functions of the PPA staff are to:

- Develop, analyze and recommend major energy policy initiatives and ensure the review and integration of policy proposals developed in the various program areas.

- Develop the analytical framework and data base for energy policy and conduct in-depth analysis and evaluation of Department policies and continual assessments of the Nation's energy situation.

- Develop and analyze legislative proposals to support policy objectives.

- Manage the Department of Energy Planning, Programming, and Budgeting System (PPBS).

- Analyze and evaluate DOE regulatory proposals for consistency with Departmental policy and effectiveness in achieving policy objectives.

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Congressional, Intergovernmental and Public Affairs

Congressional, Intergovernmental and Public Affairs programs are responsible for developing, managing and ensuring coordination of relations with the Congress; news media; State, territorial, tribal and local government officials; other Federal agencies; and consumer, citizen and business organizations; and the general public. This Office, under the direction of an Assistant Secretary, has also been responsible for fostering and assuring competition among parties engaged in the supply of energy and fuels.

The Administration's energy policies encourage the efficient production and use of energy by reducing government intervention in energy markets. As many specific energy programs are reduced and as energy programs are reorganized, the need for extensive Congressional, intergovernmental, public and consumer affairs efforts and competitive analysis is naturally diminished as well. Therefore, these activities will be reduced in 1984.

FY 1983 accomplishments include:

o Coordinated activities related to the consideration and passage of new and revised energy legislation, such as:

  Merger of the Department of Energy with the Department of Commerce, deregulation of natural gas, continued funding of the Clinch River Breeder Reactor, nuclear licensing reform, nuclear waste, electric utility industry reform, and energy emergency legislation that emanated from the statutorily required report on energy emergency response procedures.

o Continued efforts to establish and maintain effective two-way communications between the energy activities and its constituents in order to promote the development of national energy policies and programs that will strengthen the nation's economy and security, such as:

  Managed the NEPP IV nationwide public hearing process and assured that the views of other governmental levels were considered in the plan; completed the final phase of the Territorial Energy Assessment Project required by Public Law 96-597 (Omnibus Territories Act); promoted the prudent development of Indian energy resources through an interagency contract managed by DOE with the Council of Energy Resource Tribes.

o Examined the effects of Federal energy policies and regulations on state and local governments as well as consumers, such as:

  Representing DOE during the final phase of negotiations regarding the Compacts of Free Association between the U.S. Government and the Federated States of Micronesia, Palau, and the Marshall Islands; actively assisted the program office in implementing the provisions of the nuclear waste legislation providing for the necessary coordination with state, local and tribal governments; completed major report to the Senate Special Committee on Aging and continued to represent the Department in the activities and programs of the White House Office of Consumer Affairs and other consumer-oriented organizations; and, prepared competitive analyses in the areas of gasoline marketing since controls were lifted in January 1981, electric utility diversification, gasoline credit cards, gasoline marketing withdrawals, Title I of the Petroleum Marketing Practices Act, and the geothermal industry.

o Continued to work with the news media and with energy officials to ensure a balanced public affairs information program, such as:

  Arranged 100 individual interviews with news media for DOE's senior officials and responded to over 25 telephone inquiries daily from the media; issued over 100 press releases requiring review, editing, and clearance from all program offices; and produced energy newsclips for Department officials, Members of Congress and select White House staff; and managed the Departmental publications program (including contractors and grantees) as well as all audiovisual productions and exhibits developed and/or used for energy information.

Specific objectives for FY 1984 through FY 1987, formulated in response to public laws are:

- Coordinate activities related to the consideration and passage of new and revised energy legislation.
- Continue efforts to establish and maintain effective two-way communications between the energy activities and its constituents in order to promote the development of national energy policies and programs that will strengthen the nation's economy and security.
- Examine the effects of Federal energy policies and regulations on state and local governments as well as consumers.
- Continue to work with the news media and with energy officials to ensure a balanced public affairs information program.

Accomplishment of these specific objectives will help meet the objectives of pertinent Public Laws; assure clarity and consistency in information disseminated about energy programs; provide the public with opportunities for participation in appropriate energy policy decisionmaking, and reinforce the Administration's position that market-based solutions are better allocators of scarce energy resources.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Congressional, Intergovernmental and Public Affairs
Departmental Administration - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Congressional, Intergovernmental and Public Affairs (CP)				
Competition	$ 100	$ 100	$ 100	$ 0
Consumer Affairs	100	100	100	0
Public Affairs	200	103	103	150
Program Direction	6,799	6,354	6,661	3,250
Total Congressional, Intergovernmental and Public Affairs	$ 7,199	$ 6,657	$ 6,964	$ 3,400
Staffing				
FTP/Total FTE's	121/149	99/130	99/130	47/50

Authorization: Sections 102, 103, 203, 301, 655 and 801 - P.L. 95-91
Section 604 - P.L. 96-597

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Congressional, Intergovernmental and Public Affairs
(In thousands of dollars)

FY 1983 Appropriation enacted	$ 6,657
Built-in increases and decreases:	
Pay cost supplemental	+ 192
Lifting of pay cap	+ 72
Medicare	+ 43
FY 1984 base	$ 6,964
Program increases and decreases:	
Competition	
o Eliminate contractual analyses of energy competition issues	- 100
Consumer Affairs	
o Eliminate contractual support for liaison activities with consumers	- 100
Public Affairs	
o Evaluate energy publications, audiovisual products and exhibits	+ 47
Program Direction	
o Staff year decrease (80)	- 3,411
FY 1984 budget request	$ 3,400

The Office of Congressional, Intergovernmental and Public Affairs (CP) manages and ensures coordination of relations with the Congress; news media; State, territorial, tribal and local government officials; other Federal Agencies; consumer/citizen and business organizations; and the general public. CP supports energy program offices and provides policy and guidance to ensure consistency in program activities with the constituent groups mentioned above. In addition, CP staff works closely with the field activities on intergovernmental and public affairs issues as well as dealing with the news media. They also provide oversight on relations between the Department and all external groups and entities (excluding international) and on immediate or potential energy-related issues arising from or affecting these groups. The Office also participates in and provides analyses of the Department's policy discussions as they relate to Congressional, governmental and media relations. A separate office for promoting competition in the energy industry will be discontinued; these responsibilities will be assumed by other energy program officials.

The FY 1984 budget request is $3,400,000, a $3,257,000 decrease from the FY 1983 level. This amount will fund 50 FTE's, a number adequate to staff all assigned CP functions. It will also provide limited contractual support in the public affairs area.

Public Affairs

The $150,000 request will fund contractor assistance for evaluations of energy publications, audiovisual products and exhibits as required and in accordance with OMB directives. The request will also fund support services for press activities such as the use of wire services, to expedite the dissemination of press releases to major news media, and the monitoring and transcription of radio and television broadcasts on energy matters.

Program Direction

The FY 1984 budget request of $3,250,000 for program direction includes funds for staff support for congressional, public, intergovernmental and consumer activities. Also included are funds for severance and lump sum payments to those employees assigned to program functions scheduled for reduction or termination in FY 1984.

The FY 1984 request includes funding to support 21 FTE's in the Congressional affairs area. This staffing level will be sufficient to support energy program witnesses in their appearances before Congressional Committees and in relationships with Members of Congress, as well as their staffs, and to prepare briefing materials, legislative status reports and talking points for senior Departmental officials.

In the public affairs area, funds are requested to support 17 FTE's. This level will provide the capability to assure clarity and consistency in energy information dissemination to the national news media and to maintain liaison with the print and broadcast media. Coordination of media activities both in Headquarters and with the field offices can be supported. This level allows information functions to be centrally coordinated, which provides for a balanced information program, and the capability to carry out all Departmental Orders and OMB directives to review and evaluate publications, audiovisual products and exhibits. This level also provides staff to respond to public inquiries, public visitors and telephone requests; to coordinate publications distribution and to prepare briefing materials, speeches and talking points for senior Departmental officials.

Funding is also requested to provide 8 FTE's for the intergovernmental affairs function which provides a central point of contact between the Department and State, local, tribal and territorial governments, and other Federal Agencies, as well as the business and labor community to assure the participation of these constitutent groups in the development of national energy policies and programs by working closely with them.

The request includes 4 FTE's to support the consumer affairs function. The Office's primary objectives are to provide citizens with the opportunity to comment on the development of energy policies, regulations, and administrative decisions; to examine the impacts of energy policies and programs on consumers; and to support the design of programs to provide reliable and safe use of energy sources.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Departmental Administration
International Affairs - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
International Policy Studies				
Operating expenses	225	250	250	250
Subtotal	225	250	250	250
Program Direction				
Operating expenses	4,647	3,116	3,194	2,316
Subtotal	4,647	3,116	3,194	2,316
Total Operating expenses	4,872	3,366	3,444	2,566
FTEs	77/86	39/54	39/54	30/35

Authorization: Sec. 101, P.L. 96-367

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES

FY 1983 Appropriation	$3,366
Builtin increases and decreases	
Pay cost supplemental	+60
Medicare	+18
FY 1984 Base	3,444
Program increases and decreases	
Provides for a reduction in personnel from 54 FTEs to 35 FTEs, and in contractual services and travel to support our activities	-878
FY 1984 Budget Request	2,566

International Policy Studies

The Office of International Affairs has lead responsibility for keeping track of energy developments outside the United States, including both technological changes as well as their effect on economic systems. To fulfill this function, IA relies on international policy studies, which provide independent data and analyses on world energy issues and broader bases for policy formulation. The FY 1984 budget request for this activity is $250,000, the same amount as in FY 1983.

During FY 1982, some 12 studies, assessments and models were funded by International Affairs. These included such subjects as monitoring world oil tanker movements, inter-government oil deals, the structure of the international gas industry, the improvement of international nuclear safeguards, as well as industry reports to support IA's continuing responsibility to keep abreast of international energy developments. During FY 1983 several of these activities will be continued, including further development of the model to track oil tankers and improvement of nuclear safeguards. Additional international policy related studies are planned, concerning energy supply, energy security, and energy technologies.

The funding level of $250,000 requested in FY 1984 will provide for an equivalent level of activity, with shifts in the actual areas of study dependent on changes in world conditions. The funds will be expended at various national laboratories, universities, other federal agencies, and private research firms.

Program Direction

The FY 1984 budget request of $2,316,000 for program direction is a decrease of $878,000 from FY 1983. This funding provides, at a reduced level, for the salaries and benefits of IA's civil service staff, composed of international energy economists, regional and technical specialists, and world oil market analysts. The staff's professional skills permit the Office of International Affairs to perform effectively the Department's legislatively mandated role in the international energy field.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Departmental Administration
A/S International Affairs

The basic goal of the Office of International Affairs is to support the US Government in developing, implementing and evaluating US international energy and nuclear nonproliferation programs and objectives. This is accomplished by assuming a leadership role in establishing and implementing international energy policy and programs throughout DOE; integrating domestic and international energy policies and programs; administering the Department's international nuclear program including policies on nuclear cooperation, non-proliferation and exports; processing of subsequent arrangements; and developing, implementing and evaluating international cooperative arrangements.

The Office of International Affairs works to reestablish the US as a reliable supplier of nuclear technology abroad while adhering to nuclear non-proliferation objectives; processes subsequent arrangements; provides a DOE oriented international energy market evaluating and forecasting capability; negotiates and administers over 100 technical cooperative agreements with over 22 nations; provides leadership in linking domestic emergency preparedness activities with similar international endeavors; provides policy advice and support on international energy matters to the Secretary, the Deputy Secretary, other Secretarial Officers and other government agencies; and plays the lead role in US participation in the International Energy Agency (IEA), the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA).

In carrying out the Department's legislative mandate, IA was recently involved in the following activities:

- Enhancing long-term US/Mexican energy relations by promoting a series of high level nuclear related information exchanges designed to demonstrate the reliability of the US as a reliable nuclear supplier.

- Revitalizing the OECD Nuclear Energy Agency (NEA) to foster a more favorable international climate for nuclear energy.

- Representing the US government in the multiple activities of the International Energy Agency (IEA), including efforts to persuade member countries to move away from oil market intervention and regulation in the event of disruptions to reliance primarily on market forces.

- Focusing the IEA's Committee on Research and Development on the need to support international R&D cooperation on long term, high risk projects, leaving other efforts to the private sector.
- Providing international energy market analytical capability to assist US government policymakers with an overview of critical oil market trends and their related political, economic and strategic implications.
- Developing agreements for international cooperation in energy technology which are beneficial to the DOE domestic program including completion of agreements with Japan on neutron scattering and with the Federal Republic of Germany on Three Mile Island research.

The funding for International Policy Studies assists the Office of International Affairs in carrying out its responsibilities for formulating international energy policy, assessing and analyzing current global energy trends and developments, and advising the Secretary on international energy issues. These studies provide a basis for examining and assessing developments in the world energy situation which may have an impact on both domestic energy objectives and cooperative efforts with other nations. These policy studies, which are usually conducted by our national laboratories and contractor organizations, provide independent views on international energy issues that the Office of International Affairs requires to broaden its analytical base for policy formulation.

Program Direction funding will provide personnel, contractual services and travel to support the functional responsibilities of the Office of International Affairs.

Department of Energy
FY 1984 Congressional Budget Request
LEAD TABLE
COST OF WORK
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Cost of Work for Others				
Cost of Products Sold Operating Expenses...........	$18,388	$ 28,764	$ 28,764	$ 33,911
Cost of Services Performed Operating Expenses...........	29,226	80,501	80,501	82,280
Total Cost of Work for Others	$47,614	$109,265	$109,265	$116,191

Authorization: Section 161, P.L. 83-703

Summary of Changes

FY 1983 Appropriation enacted............................	$109,265
Built-in increases and decreases..........................	0
FY 1984 Base..	$109,265
Program increases and decreases:	
Decrease cost of special reactor materials..............	-1,950
Increase cost of radioisotopes..........................	+1,028
Increase cost of stable isotopes........................	+703
Increase other product costs............................	+5,366
Decrease use of Government-owned facilities.............	-3,175
Decrease cost irradiation and test reactor services.....	-780
Increase cost special services and fabrications.........	+156
Increase cost public health and safety research.........	+499
Increase other services costs...........................	+5,079
FY 1984 Budget Request................................	$116,191

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Cost of Work for Others

The purpose of the Cost of Work for Others Program is to provide an account for financing the cost of products and services supplied to qualified non-DOE users, as provided for under provisions of the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974.

The Department's FY 1984 budget request for the Cost of Work for Others Program is $116,191,000. This represents an estimate of the full-cost of requests for products and services.

Products and services provided by the Department under this program generally are not available from alternate sources. Examples of such items include special reactor materials, isotopes, irradiation and test reactor services, and special testing activities at the Nevada Test Site. Products like radioisotopes that are supplied through this program are essential to advancements in medical research.

The major objective of this program for FY 1984 - FY 1988 is to continue to fund the cost of products and services provided to qualified non-DOE users.

The cost of the Cost of Work for Others Program is offset by revenues earned in the Miscellaneous Revenue Program.

Narrative Justification
Cost of Work for Others

	FY 1983 Appropriation	FY 1984 Request
COST OF PRODUCTS SOLD		
Special Reactor Materials		
Represents cost of sales for 20.4 metric tons on non-weapon heavy water	$ 4,983	$ 3,033
Sale of Radioisotopes		
Estimated cost for all radioisotopes including special fission products and chemically produced radioisotopes	$ 5,600	$ 6,628
Sale of Stable Isotopes		
Estimated cost of sales for all stable isotopes produced at DOE Laboratories	$ 4,570	$ 5,273
Other Miscellaneous Products		
The major items in Other Products are the cost of foreign sales of weapon components and special materials totaling $13,600,000, and americium $2,814,000	$ 13,611	$ 18,977
Subtotal, Products Cost	$ 28,764	$ 33,911
COST OF SERVICES PROVIDED		
Use of DOE facilities		
Cost to lease Government-owned technical equipment, such as spectrometers and use of facilities for energy research activities.	$ 6,300	$ 3,125
Irradiation Services and Test Reactor Experiments		
Cost of irradiation services at DOE test, commerical and foreign reactor facilities including special processing and handling of radioactive materials.	$ 3,170	$ 2,390

Narrative Justification
Cost of Work for Others

	FY 1983 Appropriation	FY 1984 Request
Special Services and Fabrications		
Cost of performing technical services for non-DOE users such as special research and development studies and treating municipal water supplies near DOE facilities.	$ 1,215	$ 1,371
Research for Protection of Public Health and Safety		
Cost of reimbursed technical assistance related to public health and safety activities involving special studies, R&D, and training for handling radioactive materials.	$ 4,986	$ 5,485
Other Miscellaneous Services		
Major cost items include: Hot Dry Rock services to foreign governments, $8,000,000; construction, execution, and post-test shot activities including engineering, design and analyses for foreign governments, $38,225,000, special preparation, protection, and shipping of heavy elements, $6,847,000; conducting special training and technology programs, $4,347,000; decontamination services, $10,149,000; technical support to non-DOE R&D activities, $2,020,000; and other miscellaneous services totaling $321,000.	$ 64,830	$ 69,909
Subtotal Cost of Services Provided	$ 80,501	$ 82,280
Total Cost of Work for Others	$109,265	$116,191

Department of Energy
FY 1984 Congressional Budget Request
LEAD TABLE
MISCELLANEOUS REVENUES
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Miscellaneous Revenues				
From Cost of Work for Others Activities				
Revenue from products sold				
Operating Expenses............	$ -21,200	$ -36,741	$ 36,741	$ -42,504
Revenue from services performed				
Operating Expenses............	-45,845	-86,178	-86,178	-92,735
Subtotal, Revenues (with cost)	-67,045	-122,919	-122,919	-135,239
From Other (non-cost) activities				
Other Miscellaneous Revenues				
Operating Expenses............	-75,655 1/	52,622	-52,622	-74,380
Subtotal, Other Revenues (without cost)..............	-75,655 1/	-52,622	-52,622	-74,380
Total Revenue				
Operating Expenses..........	$-142,700 1/	$-175,541	$-175,541	$-209,619

Authorization: Section 161, P.L. 83-703

Summary of Changes

FY 1983 Appropriation enacted.................................	$-175,541
Built-in increases and decreases..............................	-0-
FY 1984 Base..	-175,541
Program increases and decreases:	
In Cost of Work for Others Activities	
Change in revenue for special reactor materials..............	-0-
Increase revenue for sale of radioisotopes...................	(+) -726
Increase revenue from sale of stable isotopes................	(+) -777
Increase other products revenues.............................	(+) -4,260
Decrease revenue from use of Government-owned facilities.....	(-) -4,252
Decrease revenue from irradiation and test reactor services..	(-) -695
Increase revenue from special services and fabrications......	(+) -194
Increase revenue from public health and safety research......	(+) -354
Increase other service revenues..............................	(+)-10,956
Subtotal, changes in miscellaneous revenues with cost	(+)-12,320
In other (non-cost) activities	
Decrease sale of nuclear materials...........................	(-) -865
Change in sale of special nuclear products...................	-0-
Change in lease of materials.................................	-0-
Increase in recovery of nuclear materials....................	(+) -1,299
Decrease in lease of lands...................................	(-) -2,500
Increase in sale of timber...................................	(+) -6
Increase in sale of steam....................................	(+)-23,700
Increase from other miscellaneous activities.................	(+) -118
Subtotal, changes in miscellaneous revenues with cost......	(+)-21,758
FY 1984 Budget Request.......................................	$-209,619

1/ Excludes $-25,200,000 In Uranium Enrichment Services Comparability transfer.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Miscellaneous Revenues

The purpose of the Miscellaneous Revenues Program is to provide an account for recording revenues earned by the Department from the sale of products and services supplied to qualified non-DOE users, as provided under provisions of the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974.

The Department's FY 1984 budget request for the Miscellaneous Revenues Program is $-209,619,000. This represents the total estimated revenue to be earned based on performing a $116,191,000 Cost of Work for Others Program and from earning $-74,380,000 in other revenues from non-cost related activities.

Revenues earned, amounting to $135,239,000, offset the $116,191,000 in cost associated with supplying important and essential products and services to qualified non-DOE users that are generally not available from alternate sources. Examples of these items include radioisotopes that are essential to medical research, special reactor developed materials, irradiation services, and test reactor experiments, and special test activities at the Nevada Test Site.

In addition to revenues earned that have a directly related cost, other miscellaneous revenues are earned as by-products of major Departmental funded program activities. These other revenue items, such as, the sale of steam that is an incidental by-product of nuclear materials production will collectively provide an estimated $-74,380,000 in additional revenues without incurring additional cost to the government.

The major objectives of this FY 1984 - FY 1987 program are is to continue to record revenues earned from providing cost and non-cost products and services to qualified non-DOE users.

Narrative Justification
Miscellaneous Revenues

	FY 1983 Appropriation	FY 1984 Request
MISCELLANEOUS REVENUES		
Revenue from Products Sold		
Special Reactor Materials		
Represents the sale of 20.4 metric tons of non-weapon heavy water.	$ -7,240	$ -7,240
Sale of Radioisotopes		
Estimated sales from all radioisotopes including special fusion products and chemically produced radioisotopes.	$ -6,077	$ -6,803
Sale of Stable Isotopes		
Estimated sales from stable isotopes produced at DOE Laboratories.	$ -5,530	$ -6,307
Other Miscellaneous Products		
The major items in Other Products are the foreign sale of weapon components and special materials totaling $-16,800,000, the sale of americium $-2,860,000, other miscellaneous products, including handling, packaging and shipping totaling $-2,494,000.	$ -17,894	$-22,154
Subtotal, Product Revenues	$ -36,741	$-42,504
Revenue from Services Provided		
Use of DOE Facilities		
Rental fees from the lease of Government-owned technical equipment such as spectrometers and use of facilities for energy research activities.	$ 7,388	$ -3,136

Narrative Justification
Miscellaneous Revenues

	FY 1983 Appropriation	FY 1984 Request
Irradiation Services and Test Reactor Experiments		
Irradiation services at test, commerical and foreign reactor facilities including special processing and handling of radioactive materials.	$ -3,590	$ -2,895
Special Services and Fabrications		
Technical services for non-DOE users, such as, performing special research and development studies and treating municipal water supplies near DOE facilities.	$ -1,255	$ -1,449
Research for Protection of Public Health and Safety		
Reimbursed technical assistance related to public health and safety activities involving special studies, R&D and training for handling radioactive materials.	$ -5,131	$ -5,485
Other Miscellaneous Services		
Major revenue items included: Hot Dry Rock services to foreign governments, $-8,200,000; construction, execution, and post-test shot activities including engineering, design and analyses for foreign governments, $-47,670,000; special preparation; protection and shipping of heavy elements, $-6,915,000; conducting special training and technology programs, $-4,434,000; decontamination services, $-10,289,000; technical support to non-DOE R&D activities, $-2,020,000; and other miscellaneous services totaling $-3,342,000.	$ -68,814	$ -79,770
Subtotal, Service Revenues	$ -86,178	$ -92,735
Subtotal, Miscellaneous Revenues with cost	$-122,919	$-135,239

Narrative Justification
Miscellaneous Revenues

Other Miscellaneous Revenue	FY 1983 Appropriation	FY 1984 Request
Revenue from Other (non-cost) Activities		
Sale of Nuclear Materials......................	$ -5,490	$ -4,625
Sale of Nuclear Products......................	$ -400	$ -400
Lease of Materials............................	$ -55	$ -55
Recovery of Nuclear Materials..................	$ -12,201	$ -13,500
Lease of Lands................................	$ -2,500	$ 0
Sale of Timber................................	$ -34	$ -40
Sale of Nuclear Reactor Steam..................	$ -31,300	$ -55,000
Other Miscellaneous Activities.................	$ -642	$ -760
Subtotal, Other Miscellaneous Revenues	$ -52,622	$ -74,380
Total Miscellaneous Revenues	$-175,541	$-209,619

DOE/MA-0064/1
VOLUME 6 OF 7

CONGRESSIONAL BUDGET REQUEST

FY 1984

VOLUME 6

FOSSIL ENERGY RESEARCH AND DEVELOPMENT
NAVAL PETROLEUM AND OIL SHALE RESERVES

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
NAVAL PETROLEUM AND OIL SHALE RESERVES
VOLUME 6

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DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	—	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	—	-3,331	—	-5,000	—	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	—	—	217,325	179,481	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	—	2,200	2,100	2,100
Special Foreign Currency	—	312	—	—	—	—
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,081	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	---	39,213	---	23,491	---	---
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

VOLUME 6

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Fossil Energy Research and Development

For necessary expenses in carrying out fossil energy research and development activities under the authority of the Department of Energy Organization Act (Public Law 95-91), [$215,514,000 and $31,700,000] including the acquisition of interest, including defeasible and equitable interests in any real property or any facility or for plant or facility acquisition or expansion, $138,000,000, to remain available until expended, of which $31,000,000 is to be derived from unobligated prior year balances in the Fossil Energy Research and Development and Construction accounts and $13,000,000 to be derived by transfer from the account in Public Law 96-126 (93 Stat. 970(1979)) entitled "Alternative Fuels Production"[, and $40,000,000 to be derived by transfer from the account in Public Law 96-304 entitled "Energy Security Reserve" established to carry out the provisions set forth in section 204(a)(2) of the "Energy Security Act" (Public Law 96-294), to remain available until expended: Provided, That no part of the sum herein appropriated shall be used for the field testing of nuclear explosives in the recovery of oil and gas: Provided further, That the facilities associated with the Carbondale Mining Research Center shall be made available to the Department of Energy for lease or other suitable arrangement by the Department of Energy to Southern Illinois University: Provided further, That $2,000,000 appropriated under the account entitled "Alternative Fuels Production" in Public Law 96-126 (93 Stat. 970 (1979)), for project development feasibility studies, is hereby transferred to this account to be used until expended for a jointly funded feasibility study of a Western Hemisphere alternative fuels facility which would utilize coal exported from the United States].

Explanation of Change

Proposed FY 1984 appropriation language deletes provisions contained in the FY 1983 Interior and Related Agencies Appropriations Act which are unique to FY 1983. Proposed language also provides for transfer of prior year unobligated balances from former Fossil Energy Research and Development and Fossil Energy Construction accounts to the new single account, Fossil Energy Research and Development.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV	1	1	1
EXECUTIVE LEVEL V			
SUBTOTAL.	1	1	1
ES-6	1	1	1
ES-5	1	1	1
ES-4	10	10	8
ES-3	8	8	8
ES-2	3	3	3
ES-1	3	3	3
SUBTOTAL.	26	26	24
GS-18			
GS-17			
GS-16			
GS/GM-15	76	65	65
GS/GM-14	117	75	76
GS/GM-13	164	93	92
GS-12	133	70	76
GS-11	81	38	36
GS-10	15	9	9
GS-9	76	51	51
GS-8	34	27	27
GS-7	43	28	28
GS-6	41	23	23
GS-5	34	22	23
GS-4	9	7	8
GS-3	1	3	2
GS-2			
GS-1			
SUBTOTAL.	824	511	516
UNGRADED	81	20	20
TOTAL PERMANENT POSITIONS	932	558	561
UNFILLED POSITIONS, END OF YEAR . . .	13		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	919	558	561

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
COAL:			
Mining R&D	10,992	—	—
Coal Liquefaction	228,384	37,600	17,000
Surface Coal Gasification	54,168	39,000	16,900
Underground Coal Gasification	8,256	6,000	2,000
Advanced Research and Technology Development	56,256	35,950	30,540
Control Technology and Coal Preparation	25,152	27,900	17,050
Heat Engines and Heat Recovery	15,408	5,000	1,000
Combustion Systems	41,044	24,200	8,400
Fuel Cells	34,464	30,050	9,500
Magnetohydrodynamics	27,840	29,000	—
Program Direction	11,804	8,200	7,060
Energy Technology Center Program Direction - Coal	—	23,000	—
Subtotal, Coal	513,768	266,600	109,450
PETROLEUM:			
Enhanced Oil Recovery	16,176	6,500	11,250
Oil Shale	19,152	12,250	8,600
Advanced Process Technology	4,032	5,000	2,900
Program Direction	1,555	600	600
Energy Technology Center Program Direction - Petroleum	—	3,450	—
Subtotal, Petroleum	40,915	27,800	23,350
GAS:			
Unconventional Gas Recovery	11,520	13,900	5,000
Capital Equipment	192	—	—
Program Direction	442	200	200
Energy Technology Center Program Direction - Gas	—	2,850	—
Subtotal, Gas	12,154	16,950	5,200
Subtotal, Fossil Energy R&D	566,837	311,350	138,000
Use of Unobligated Balances	—	-93,336	-31,000
Transfer from Alternative Fuels	—	—	-13,000
FY 1981 Deferrals	-149,100	—	—
Total, Fossil Energy R&D	417,737	217,514	94,000

FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$217,514	$ 94,000
Unobligated Balances:		
Start of year unobligated balances	180,844	31,000
Unobligated balances transferred to other appropriations	-68,642	...
Unobligated balances transferred from other appropriations	73,700	13,000
End of year unobligated balances	-31,000	...
Total Obligations	$372,416	$138,000

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Fossil Energy

Fossil fuels--oil, natural gas and coal--accounted for 90 percent of the energy consumed in the United States during 1980, and will supply the majority of the Nation's energy needs well into the next century. As conventional supplies of domestic oil and gas are depleted, the Nation will look increasingly to coal as a primary source of energy. It will also take increasing amounts of unconventional gas and oil (that is, oil and gas not recoverable by present methods) and of synthetic fuels produced from massive United States coal and shale resources, to meet our national demand, and keep imports at a level consistent with national security and economic vulnerability considerations. Much of this supplemental production will have to come from technologies that are just being introduced or are still under development. Similarly, the future production of electricity and process heat is expected to rely heavily on advanced coal combustion and conversion technology that is more efficient and environmentally benign than present technology.

The rate at which new fossil energy technologies enter the marketplace will depend on a variety of interrelated factors, including overall energy costs, local air and water quality standards, regional water availability, socioeconomic impacts, and other factors such as import availability, regulatory reform, tax and other investment incentives. Advanced technology can have a favorable impact in many of these areas. For example, a new, high-efficiency process may not only produce energy less expensively that an older, less efficient process, but also, if emissions remain the same for both, would result in fewer emissions per unit of energy produced.

While the Nation is fortunate to have abundant fossil energy resources, diverse and extensive advances are needed in the scientific and engineering knowledge base to use these resources effectively. Systematic technological advances must occur in all stages of the research, development, and commercialization cycle--from basic science to applied research, proof-of-concept, process development, and finally to commercialization. The latter stages of this cycle are the most costly, and this is where extensive private sector investments will be required to take advanced technologies into commercial reality. The earlier stages, through proof-of-concept, feed this research-and-development investment pipeline through the results of longer term, high-risk, and potentially high-payoff research. While R&D in these earlier stages may have a very high benefit/cost ratio from the public perspective, private sector investment may be restricted or nonexistent because payoffs are frequently difficult to predict, highly risky, or long term, or cannot be captured by private firms.

Thus, there is a valid Federal role to provide front-end R&D support in several areas of fossil fuel technology. This support is provided through the Office of Fossil Energy, and is geared toward establishing an adequate scientific and engineering knowledge base to foster technological advances through private sector initiative as well as to remove key uncertainties. Since January 1981, the Office of Fossil Energy has reoriented its program to meet the newly defined roles of the private sector and Government in technology development as outlined in the Administration's policies and guidelines.

Within the context of its primary mission, the Office of Fossil Energy has evolved an approach for evaluating potential activities. This approach recognizes that the United States, for the foreseeable future, is inextricably dependent on oil, particularly for transportation and petroleum based chemical products, and that a significant portion of that oil will be imported. Several recent, major energy projections estimate that up to 40 percent of the petroleum used by the United States in the year 2000 will be imported. Historically, events impacting petroleum supply and price have happened quickly and unpredictably. So, if there is a long lead-time for market adjustment to longer term price shocks through reduced demand, alternative sources, and substitute fuels, severe economic impacts could result. However, these impacts can be reduced if there are "fall back" capabilities, including the ability of the private sector to efficiently implement advanced technology options supported by a sound technology base. Thus, periods of relative price stability allow time for research and development of major innovations and less expensive advanced technologies, as well as time to develop the information that can help mitigate environmental concerns associated with a transition to the new technologies.

The timing and required rate of this transition is highly uncertain. The sources of these uncertainties include many factors over which the Nation has little or no control: e.g., uncertainty over the extent and economics of recovery of the undiscovered domestic conventional petroleum resources is very large. While our knowledge about the size and cost will gradually unfold over time, the size is not significantly susceptible to control or change. Of equal importance, the extent and price of future imported supplies of conventional petroleum-based fuels is highly uncertain. A third class of uncertainties deals with technical, economic, and environmental performance potentials of new fossil technologies which have the potential for contributing to the technological innovation required to achieve transition. These uncertainties are subject to resolution through public and private investments in research and development.

As a result, the Fossil Energy strategy gives high priority to activities directed at establishing data bases that will enable industry, with the assistance of the Synthetic Fuels Corporation where necessary, to develop technological options for new liquid supplies and liquids substitutes with acceptable environmental impacts. This includes work on advanced technologies for recovering oil from the large, currently unrecoverable portion of petroleum resources, from shale and tar sands, and from coal via direct and indirect liquefaction. Also included are those aspects of coal gasification technologies which are critical to the development of advanced processes for both direct and indirect coal liquefaction as well as activities supporting the development of advanced technologies (including portions of combustion, control technology, heat engines, fuel cells) that substitute coal for oil in utility and industrial applications where conventional coal-fired technology is now effectively precluded.

The Fossil Energy strategy recognizes several other high priority areas. Gaseous fuels can substitute for liquid fuels in many applications. There appears to be adequate U.S. reserves of natural gas for several decades if conventional and unconventional gas resources can be exploited. Unconventional gas will not realize its potential unless there is additional development of the scientific and engineering knowledge for associated extraction technologies.

Another high priority area deals with establishing the scientific and engineering foundations for greatly increased use of coal and other abundant fossil energy resources through improved technologies (including portions of combustion, control technology, fuel cells) with high payoffs in improved economic performance, improved efficiency and flexibility of coal use, and improved environmental performance. This includes generic and crosscutting research (Advanced Research and Technology Development plus Advanced Process Technology programs) that can contribute to the solution of longer-range liquids, gas, and electricity supply problems that will arise and persist after the year 2000.

All of the high priority R&D cited above must be coupled with appropriate environmental research. This includes work needed to establish data bases that help mitigate problems rather than merely expand the range of questions and concerns. The objective of this research is to characterize potential impacts and the performance of new and developmental systems in controlling these impacts so that cost beneficial solutions to environmental concerns are available on a schedule consistent with the progress of technology development.

The proposed FY 1984 budget is a balanced program which addresses the needs identified above and focuses on activities which attract no or little private sector funding. The levels of Federal support in the budget for the various Fossil Energy technologies are believed to be appropriate when compared to the needs and to the levels of Federal funding not only for other energy related technologies but also for other governmental activities.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

COAL

VOLUME 6

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Control technology and coal preparation (FE)				
Coal preparation:				
Operating expenses	$ 2,880	$ 8,000	$ 8,000	$ 5,000
Subtotal	2,880	8,000	8,000	5,000
Flue gas cleanup:				
Combined flue gas cleanup				
Operating expenses	6,240	7,000	7,000	7,600
Subtotal	6,240	7,000	7,000	7,600
Gas stream cleanup:				
Operating expenses	9,984	10,000	10,000	4,450
Subtotal	9,984	10,000	10,000	4,450
Cleanup base technology:				
Operating expenses	5,280	2,900	2,900	...
Subtotal	5,280	2,900	2,900	...
Total				
Operating expenses	24,384	27,900	27,900	17,050
Capital equipment	768	...	...	...
Control technology and coal preparation	$25,152	$27,900	$27,900	$17,050
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$27,900
Program increases and decreases:	
Coal Preparation	
o Reduce level of effort in areas of chemical coal cleaning, fine size physical cleaning and other ancillary operations	-3,000
Flue Gas Cleanup	
o Initiate bench scale evaluation of one additional advanced NO_x/SO_x combined flue gas cleanup process. Initiate systems integration studies on combining NO_x/SO_x/particulate capture in one process	+600
Gas Stream Cleanup	
o Redirect efforts to pursue only the most promising concepts at the laboratory scale	-5,550

Cleanup Base Technology

- o Complete ongoing FY 1983 contractual efforts and compile waste characterization data base and RCRA impact assessment for government and private sector utilization .... -2,900

FY 1984 budget request $17,050

Control technology and coal preparation:

Goals/Objectives:

Economic and social barriers to a rapid, widespread replacement of oil by coal derive mainly from quality differences. Compared to oil and gas, coal is dirty. The inert matter in even our best coals imposes cost penalties in transportation and utilization. Additional costs are incurred in burning most United States coals because of the considerable sulfur or nature of the mineral constituents or trace elements they contain. This added cost burden results from specific requirements for environmental management, waste disposal, boiler design modifications, and ancillary equipment capacity. In summary, the ultimate cost of electricity or process heat is strongly dependent on technologies dealing with coal quality, environmental emissions, and waste disposal. A sound advanced technology base in the interdependent technologies of coal beneficiation, gas cleaning, and waste disposal is essential to critical economic and engineering analyses of site-specific coal utilization requirements. This, in turn, is necessary to achieve the highest degree of cost effectiveness in the expanded utilization of United States coals. The goals of the Control Technology and Coal Preparation activity are to identify and develop a range of advanced engineering approaches capable of:

- o Upgrading the quality of United States coals to quality levels far exceeding state-of-the-art capability.
- o Improving the ability to remove flue gas pollutants for compliance with present and expected tighter emission standards.
- o Removing undesirable substances produced during gasification and/or combustion from process streams, thus protecting utilization equipment such as turbines and fuel cells.

The functional organization of this activity forms four logical subactivities: (1) Coal preparation; (2) Flue gas cleanup; (3) Gas stream cleanup; and (4) Cleanup base technology.

Coal preparation is directed towards the development of advanced coal cleaning technologies to upgrade the quality of United States coals to levels comparable to fuel oil. Flue gas cleanup addresses the removal of pollution causing contaminants from the stack gases of conventional combustion units to meet environmental standards. Efforts will be focused on developing advanced processes for the combined removal of NO_x, SO_x, and particulates, both for utility and industrial applications. Gas stream cleanup includes the technology for removal of contaminants from gasifier and combustor process streams prior to utilization in advanced power conversion cycles such as gas turbines and fuel cells. Both hardware and environmental protection are key concerns. Cleanup base technology focuses primarily on waste management and utilization.

FY 1983 Accomplishments:

Accomplishments expected in FY 1983 include:

- o Completed laboratory evaluation of high gradient magnetic separation of pyrite and ash from fine coal.
- o Completed proof-of-principal testing of two stage froth flotation technology to extract minerals and pyrites from fine coal.
- o Completed laboratory research on fused salt and microwave processes to reduce coal sulfur and ash to levels comparable to No. 2 fuel oil.

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,651
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	190	168	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,330	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,120	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,670	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX ENERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

- Completed laboratory evaluation of true heavy liquid cyclone beneficiation of fine coal.
- Initiated testing at laboratory scale of present recovery and regeneration for alkali salt cleaning processes.
- Completed preliminary laboratory scale testing of ultrasonic communition technology.
- Completed construction/initiated tests on E-Beam/Lime flue gas cleanup PDU.
- Completed first phase on PETC copper/nitrogen/sulfur oxides flue gas cleanup PDU.
- Initiated construction of E-Beam/Ammonia flue gas cleanup PDU.
- Initiated laboratory test phase of advanced NO_x/SO_x combined flue gas cleanup process candidates selected under the Program Research and Development Announcement (PRDA).
- Completed proof-of-concept testing of electrostatic precipitator for pressurized fluidized-bed combustor (PFBC) particulate control.
- Initiated bench scale evaluation of selected PFBC particulate control system components to determine problems for future scale-up.
- Completed effort on the determination of molten carbonate fuel cell contaminant tolerance in order to provide cleanup system requirements.
- Evaluated zinc ferrite hot gas desulfurization process for integration with a fluid-bed gasifier PDU for a limited number of hours.
- Completed coal derived waste sampling and characterization activity and RCRA impact assessment for the utility sector.
- Completed the development of a lightweight insulating cellular concrete from FBC waste and pulverized coal fly ash.
- Completed investigation into aerobic and anaerobic digestion of gasifier waste water. The anaerobic process produces methane as a usable byproduct.
- Completed evaluation of a roadbed material based on FBC wastes and pulverized coal fly ash.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Coal preparation	$ 8,000	$ 5,000	$ -3,000

The goal of the coal preparation program is to help private industry develop coal cleaning technology to reduce the ash and sulfur content of United States coal so the product can be formulated into a high quality fuel that could replace oil and/or natural gas in both new and retrofit applications in utility boilers, industrial boilers and process heaters, residential/commercial boilers and furnaces, and heat engines such as gas turbines and diesel engines. The goals of the chemical and/or physical processes developed are (1) the desulfurization of all ranks of United States coals to meet New Source Performance Standards so that coal based fuels may be used to replace oil and natural gas with the most cost effective combination of coal cleaning and post-combustion cleanup devices, and (2) the reduction of ash concentrations to levels which permit the cleaned coal to be used as a replacement for premium fuels either as a slurry or as a conditioned product. An outcome of Federal participation must be a data base sufficient to enable private sector assessment of commercial viability of the advanced physical and/or chemical preparation technologies. Most United States coals resist conventional cleaning practices either because the ash and sulfur constituents are too finely disseminated in the coal structure or because the organic sulfur, which does not respond to physical cleaning, is too high. Low rank coals and lignites are handicapped by excessive moisture contents and unfavorable ash characteristics. The principal thrust of the coal preparation program is directed towards:

- New and advanced cost-effective technologies to clean and condition finely divided coal as necessary to liberate finely dispersed pyritic sulfur and ash particles.
- Advanced, unconventional methods to extract organic sulfur from coal.
- Advanced technologies to beneficiate low rank coals and lignite.

The existing program encompasses laboratory bench scale research to physically liberate and separate finely disseminated pyrite and mineral impurities in all United States coals. Parallel efforts under Alternate Fuel Mixtures within the Combustion Systems activity are directed towards the preparation and utilization of highly cleaned coal water slurries as retrofit fuels for oil and gas designed units. Two chemical concepts are being evaluated at the bench scale level which give promise of cleaning coals to a quality level comparable to fuel oil.

The proposed FY 1984 program would continue laboratory and bench scale research while simultaneously evaluating critical engineering design and performance uncertainties in selected, high potential payoff areas. These include (a) physical beneficiation of fine coal by advanced high gradient magnetic separation, heavy liquid cyclone beneficiation, and superfine coal (15 microns) agglomerative beneficiation; (b) communition and fine coal dewatering and consolidation; (c) a selected chemical cleaning process to reduce remnant sulfur and ash to levels comparable with fuel oil; and (d) dewatering and beneficiation of prototypic sub-bituminous coals and lignites. Activities would be directed towards the evaluation of engineering, design and operating variables using sub-scale prototypic equipment as needed to allow private sector assessment of commercialization risks. The beneficiated coal products developed under this subactivity will become feedstock for activities in Combustion Systems and Heat Engines aimed at the conversion of existing utility and industrial units from oil or gas to coal; new units fired either conventionally or by coal slurries; direct firing of coal in power conversion equipment (e.g., gas turbines, diesels); and export steam coal. The FY 1984 projects would entail small scale test rigs designed to develop essential engineering data. The potential benefits of this work apply to the anticipated growth of coal consumption (slurry or solid form) by utilities and industry in the 1990's. New equipment designs and/or conversion of existing units to coal or coal based slurries, initiated in the late 1980's, could benefit from the availability of the superior coal quality sought by this program. However, basic technology data should be available to the private sector for consideration in the 1986-1990 period because of lead time constraints.

The following accomplishments are anticipated for FY 1984:

- Definition of basic technological design and operating requirements for cleaning United States coals to quality levels comparable with oil.
- Definition of new technologies to finely grind, dewater and consolidate cleaned, fine coal for bulk shipment and conventional firing at minimum processing cost.
- Definition of dewatering and cleaning technologies to beneficiate coal and lignite to levels far exceeding state-of-the-art capability.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Flue gas cleanup	$ 7,000	$ 7,600	$ +600
Combined flue gas cleanup	$ 7,000	$ 7,600	$ +600

This program focuses on the development of a technology base for simple, cost effective, and environmentally superior processes that remove pollutants from coal combustion gas streams in both utility and industrial boilers in light of existing, as well as anticipated, more stringent environmental standards.

The primary pollutants as identified in the New Source Performance Standards (NSPS), include sulfur oxides (SO_x), nitrogen oxides (NO_x), and particulates. SO_x is formed in the combustion process as the result of the oxidation of sulfur contained in the mineral portion of the coal as well as the oxidation of organically bound sulfur. Most of the sulfur is oxidized to sulfur dioxide (SO_2). NO_x compounds are formed during the combustion process from the reaction of molecular nitrogen and oxygen in the combustion air (thermal NO_x) and from the oxidation of nitrogen compounds in the coal (fuel bound NO_x). Particulates result from the ash content of the coal. In addition to these three pollutants, hydrocarbon emissions are another area of concern.

The pollutants produced during the coal combustion process as a whole are suspected of being a cause of various adverse environmental and health effects, as well as acting as irritants to the mucous membranes and the pulmonary system. Furthermore, the overall effect of the pollutants may be synergistically compounded through their interaction with each other. For example, nitric oxide (NO) from flue gas is readily oxidized in the atmosphere to nitrogen dioxide (NO_2) which, in the presence of sunlight and hydrocarbons, is a precursor of photochemical smog; SO_2 is absorbed onto the surface of particles and can cause an otherwise benign particle to act as an irritant. Finally, there is the acid rain question. Although not scientifically proven, both NO_x and SO_x compounds are suspected precursors of acid rain. While previously thought to be primarily a sulfate problem, recent research indicates that NO_x plays a much more important role in this phenomenon than heretofore suspected, both in the disposition of nitric acid as well as in catalyzing the oxidation of atmospheric SO_2 to SO_3 (sulfur trioxide) which readily reacts with atmospheric moisture to form sulfuric acid.

Existing flue gas desulfurization technology, while meeting sulfur removal requirements, in many cases merely converts an air pollution problem to a solid waste disposal problem. This occurs in the form of difficult-to-handle sludges, whose disposition measurably adds to overall environmental control costs. Combustion modification can control NO_x emissions to existing standards. If these standards were to be tightened, however, an additional process step would have to be added (such as the reduction of NO_x by ammonia, either catalytically or non-catalytically). Our efforts have, therefore, been focused on the research and development of processes with the potential to remove both NO_x and SO_x simultaneously in a one process step. This work will provide the technology base for the eventual commercialization of combined NO_x/SO_x removal systems capable of meeting more stringent environmental standards in the future at a cost below that of separate NO_x and SO_x control systems. Furthermore, the processes to be considered will only be those that exhibit relatively benign or possibly useable or marketable waste products. This will avoid the problems and costs associated with the handling and disposal of sludges that are characteristic of lime/limestone scrubbers. In addition, research will be conducted on hydrocarbon emissions characteristics (a potential problem in lignite combustion where the high moisture content depresses flame temperature, and thereby inhibits hydrocarbon cracking) as well as on particulate characteristics and assessment of particulate control technology. Particulates are of concern, since NSPS addresses only total suspended particulates and not respirable particles, which are under two microns in diameter, a size range in which existing particulate control technology (electrostatic precipitators and bag houses) performance begins to deteriorate. Because of the long leadtime between the initiation of research and development and the eventual commercialization of flue gas cleanup systems, as well as the fact that system performance is dictated by Government regulations, the private sector is, for the most part, unwilling to pursue this type of work on their own since changing regulations can render their developments obsolete and their expenditures fruitless.

The FY 1984 activities will concentrate on continuing the development of combined NO_x/SO_x flue gas cleanup concepts resulting from awards made in FY 1983 under the Program Research and Development Announcement. Testing of the electron beam/ammonia process development unit will be completed. Particulate and hydrocarbon emissions characterization will continue. An assessment will be made on the technical viability of particulate precharging, using electron beams in order to improve respirable particulate capture in electrostatic precipitators. Systems integration studies will be initiated to combine SO_x/NO_x/particulate capture in one process step.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Gas stream cleanup	$10,000	$ 4,450	$ -5,550

The primary objective of this project is to develop the required technology base in gas stream cleanup for applications in post combustion/utilization devices used as advanced power conversion systems such as fuel cell and gas turbine combined cycles and, where applicable, in other conversion processes where significant process improvement results. The gas streams range up to 2400°F in temperature and 500 psi in pressure and contain contaminants that, if not removed, will cause failure of the conversion cycle equipment, as well as prevent meeting the environmental emissions standards. Cleanup at an elevated temperature offers advantages of increased cycle thermal efficiency and reduced capital cost for downstream power conversion applications. Capital cost reductions are attributable to the elimination of the need for process equipment to quench and reheat the gas stream and to treat the contaminated waste water from the quenching process and eliminate complex "wet" cleanup systems. Contaminants of concern are dependent upon the specific application. Energy conversion systems will have to meet New Source Performance Standards (NSPS) requirements in terms of NO_x, SO_x, and particulate emissions. Emphasis in combustion gas cleanup has been on control of alkalies and particulates found in pressurized fluidized-bed combustor (PFBC) gas streams powering gas turbine combined cycles. The PFBC has demonstrated the capability to meet NSPS with respect to NO_x and SO_x emissions. The turbines, however, are subject to corrosion, erosion, and deposition. Corrosion in PFB turbines is primarily caused by the presence of alkali sulfate compounds in the liquid state. Erosion results from the impact of high velocity particulate material. Deposition is caused by a buildup of fine particles on the turbine surfaces. Tests have demonstrated that the simultaneous occurrence of erosion and corrosion exhibits a synergistic effect; that is, the combined rate is greater than the sum of the two processes occurring independently. Since the PFB gas turbine operates on sensible heat from the gas stream, it is essential that cleanup processes be accomplished at or near bed temperature. At present, there are no commercially available processes for alkali vapor removal. The gasifier can be used as an energy source for either a gasifier/gas turbine combined cycle or a fuel cell (primarily of the molten carbonate type). In addition to the alkalies and particulates previously mentioned, the gasifier gas turbine system must control NO_x precursors such as ammonia along with sulfur compounds. For fuel cell applications the control of sulfur is especially critical since tolerance to sulfur compounds is on the order of 0.1 to 1.0 parts per million to minimize sulfide formation at the nickel anode. The fuel cell also requires stringent control of chlorine compounds in the fuel gas stream.

Based upon prior year research and development (R&D) work for removal of particulate and alkali contaminants from the combustor gas stream, there are several removal concepts that have distinct cost and performance advantages. Consequently, the FY 1984 budget will be directed at continuation of the lab scale R&D effort for these devices. The lab scale tests, where practical, will be conducted on actual coal fired combustor systems to better identify the key components requiring further developmental work that is critical to future PDU scale testing for concept verification and subsequent industrial commercialization. A preliminary economic/performance analysis for selected PFBC cleanup devices will be conducted to provide a partial baseline for future Government or private sector system development programs.

Molten carbonate fuel cell cleanup work will continue on hot gas desulfurization process development and integrated desulfurization/dechlorination processes but at a reduced level on a single selected gasifier.

Anticipated FY 1984 accomplishments include:

- Determining key critical component problems for the PFBC cleanup techniques for removal of alkalies and particulates.
- Completing preliminary economic/systems analysis for selected PFBC cleanup devices to determine the comparative merits of each.
- Testing the zinc ferrite desulfurization process on a single selected gasifier with a molten carbonate fuel cell stack system for a limited number of hours.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Cleanup base technology	$ 2,900	$ ...	$ -2,900

Combustion of coal is expected to substantially increase over the next twenty years in response to a rising price differential between coal and alternate fuels. This increased coal consumption and the increased use of alternate fuel processes, along with resulting increased utilization of flue gas scrubbing processes, may result in increasingly numerous waste management problems.

The waste management program has consisted of four activities: (1) sampling and characterization; (2) volume reduction (utilization); (3) decontamination (resource conservation); and (4) disposal. Both physical and chemical properties of waste coal streams can vary widely depending on the original coal source, the method of coal treatment, and the process used to combust or otherwise utilize the coal. Some coal waste streams may be prime candidates for utilization while others would not, due to chemical, physical or morphological properties. Characterization of these waste streams includes not only a chemical analysis, but also analysis of the physical and morphological properties. The aim here has been to develop, at bench and subpilot scale, promising methods for waste disposition in an environmentally and economically acceptable manner. An additional activity involves technical and economic assessments to determine the potential of processes being developed. It also provides early economic assessments of these processes for the private sector as it considers further development of these techniques.

No funds are requested for this activity in FY 1984. The FY 1983 waste management activities will be redirected to produce research data which can form the information base for future waste management initiatives and become the source for industrial follow-up developmental activities. Efforts will be made to complete ongoing contractual activities initiated in prior years.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Control Technology and Coal Preparation

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Coal Preparation	Complete laboratory evaluation of high gradient magnetic separation of pyrite and ash from fine coal.	Evaluate critical engineering design and performance issues in the areas of: physical beneficiation of fine coal; communition and fine coal dewatering and consolidation; chemical cleaning; and dewatering and beneficiation of low rank coals and lignites.
	Complete testing of two stage froth flotation technology to extract minerals and pyrites from fine coal	
	Complete laboratory research on fused salt and microwave processes to reduce coal sulfur and ash to levels comparable to No. 2 fuel oil	
Flue Gas Cleanup	Initiate laboratory test phase of advanced NO_x/SO_x flue gas cleanup concept.	Initiate bench scale evaluation of one additional advanced NO_x/SO_x flue gas cleanup concept.
	Complete construction/initiate tests on E-Beam/Lime flue gas cleanup PDU.	Complete testing of the electron beam/ammonia PDU.
	Initiate construction of E-Beam/Ammonia flue gas cleanup PDU.	Initiate systems integration studies to combine NO_x/SO_x/particulate capture in one process.
Gas Stream Cleanup	Complete proof-of-concept testing of electrostatic precipitator for PFBC particulate control.	Continue the lab scale R&D effort on particulate and alkali removal concepts.
	Initiate bench scale evaluation of selected PFBC particulate control system components.	Complete preliminary economic/performance analysis for selected PFBC cleanup devices.
	Evaluate zinc ferrite hot gas desulfurization process for integration with a fluid-bed gasifier PDU.	Test the zinc ferrite desulfurization process on one gasifier.
Cleanup Base Technology	Complete coal derived waste sampling and characterization activity and RCRA impact assessment for the utility sector.	Complete ongoing FY 1983 contractural efforts.
	Complete the development of a lightweight insulating cellular concrete from FBC waste and pulverized coal fly ash.	Compile waste characterization data base and RCRA impact assessment.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Advanced research and technology development (FE)				
Processes:				
Operating expenses	$18,624	$ 7,500	$ 7,500	$ 7,000
Subtotal	18,624	7,500	7,500	7,000
Direct utilization:				
Operating expenses	10,368	10,600	10,600	4,800
Subtotal	10,368	10,600	10,600	4,800
Materials and components:				
Materials				
Operating expenses	7,680	6,940	6,940	5,500
Components				
Operating expenses	1,920	860	860	1,000
Subtotal	9,600	7,800	7,800	6,500
Program development and coordination:				
Budget and administration				
Operating expenses	576	...	...	...
Construction	3,840	2,800	2,800	5,040
Engineering analysis				
Operating expenses	1,536	...	...	...
Environmental activities				
Operating expenses	2,880	2,000	2,000	1,000
Planning and policy				
Operating expenses	...	1,000	1,000	700
Technology base synthesis				
Operating expenses	1,056	...	...	...
Instrumentation, control, and diagnostics				
Operating expenses	2,112	...	...	...
Subtotal	12,000	5,800	5,800	6,740
University coal research:				
Operating expenses	5,184	2,750	2,750	4,000
Subtotal	5,184	2,750	2,750	4,000
Total				
Operating expenses	51,936	31,650	31,650	24,000
Capital equipment	480	1,500	1,500	1,500
Construction	3,840	2,800	2,800	5,040
Advanced research and technology development	$56,256	$35,950	$35,950	$30,540
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$35,950
Program increases and decreases:	
Processes	
o Gasification - Conduct fundamental studies on relationship of coal ash components and coal behavior during gasification..	-225
o Liquefaction - Continue research on novel liquefaction concepts	-275
Subtotal	$ -500
Direct Utilization	
o Reduce technology base development in coal combustor research	-5,800
Materials and Components	
o Materials - Reduce overall scope of materials program	-1,440
o Components - Continue modest components research	+140
Subtotal	$-1,300
Program Development and Coordination	
o Environmental activities - Reduce crosscutting activities related to ES&H in Fossil Energy program	-1,000
o Planning and policy - Reduce overall long range planning and policy development	-300
o Provide construction funding for general plant projects at ETC's and the METC and PETC waste water treatment facilities..	+2,240
Subtotal	$ +940
University Coal Research	
o Conduct fundamental coal research at universities through grants	+1,250
FY 1984 budget request	$30,540

Advanced research and technology development:

Goals/Objectives:

The Advanced Research and Technology Development (AR&TD) activity plays an important role in the Department's Fossil Energy program through development of the technology base in coal. Basic, applied, and exploratory high risk, potentially high payoff research at the Energy Technology Centers and National Laboratories, universities and industrial laboratories helps extend the fundamental scientific and engineering knowledge base providing ideas for new processes and technical breakthroughs in coal conversion and utilization.

The approach of the AR&TD coal program is to focus on mission-oriented research that leads to an increased understanding of fundamental mechanisms of coal conversion to gas and liquid fuels and direct coal combustion. Also included are generic studies of materials, and components in environments normally associated with advanced coal technologies. An important goal in each AR&TD program element is the discovery of novel concepts and the small scale testing of these concepts for scientific and technical feasibility. The AR&TD program differs from the advanced and engineering development line programs in that the line technology programs are aimed at solving problems related to the technical, environmental and economic feasibility and reliability of specific coal processing and utilization processes. These development end projects generally are conducted at a larger scale and at a concomitant increase in individual project cost as compared to those in the AR&TD program. The AR&TD program is unique in that it is directed to specific technical areas which are closely connected to long-range Fossil Energy objectives, thus differentiating these activities from the broader mandate of the Office of Energy Research which principally supports basic research not specific to fossil energy technologies.

The main objectives of the AR&TD activity are to:

- Provide a focal point for governmental involvement in fundamental, exploratory, and advanced research on coal.
- Explore new and advanced processes for converting coal to clean gaseous and liquid fuels and chemical feedstocks.
- Develop a better understanding of coal liquefaction and gasification processes, coal chemistry and related process engineering sciences.
- Expand the data base, understanding, and verified modeling capability covering those chemical and physical phenomena critical to the design and performance of improved coal combustion systems.
- Improve operation of fossil fuel facilities through the better understanding of the behavior of materials and components.
- Explore new materials, catalysts and electrolytes for fuel cell systems.
- Provide assessment and coordination of research and environmental support to Fossil Energy advanced programs.
- Coordinate the planning and development of a balanced Fossil Energy program.
- Coordinate, assess and plan Fossil Energy advanced research including international and cross-cut activities.

To accomplish these objectives, the activity is divided into the following principal functional areas: processes, utilization, materials and components, university coal research, and program development and coordination.

The objectives and goals are achieved through research carried out by industrial organizations, national laboratories, universities, non-profit private laboratories and the Energy Technology Centers.

FY 1983 Accomplishments:

The expected FY 1983 accomplishments include:

- Utilized highly instrumented test flow loop to expand the data base relating the coal-water mixture rheological properties to coal type, particle size distribution, and generic surfactant characteristics.
- Developed a new method for effectively and efficiently classifying coal using pyrolysis mass spectrometry and computerized pattern recognition techniques which is a better predictor of liquefaction yields than conventional methods.
- Formulated a reaction model to explain observed corrosion in a wide range of coal conversion chemistries.
- Determined the effects of chemical and physical characteristics of high boiling range solvents on coal liquefaction reactions.
- Developed a more thorough understanding of novel gasification concepts, chemistries, and processes to generate a fuel and/or synthesis gas.
- Completed development of essential operational components such a high pressure oxygen compressor, coal slurry pump and prototype lockhopper valve.
- Continued efforts in planning, environmental activities, and budget and administration in support of fossil energy research and development.
- Continued fundamental research on coal at universities.
- Identified role of ceramic powder purity and morphology on structural ceramic microstructure.
- Completed ceramic fiber research program.
- Resolved differences in different fundamental theories of the combustion process of coal-water mixtures.

- Continued efforts related to fuel cell materials R&D.
- Completed assessment for novel coal combustion control technique.
- Initiated studies of fundamental dynamic bed behavior in fluidized bed combustors.
- Initiated a study of a new and novel fundamental process to remove organic sulfur from coal.
- Studies the relationship between fundamental chemical and electrochemical reactions of individual combustion products.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Processes	$ 7,500	$ 7,000	$ -500
Liquefaction	$ 4,125	$ 3,850	$ -275

The main focus of this subactivity is small scale, fundamental phenomenological studies in coal science and coal liquefaction including exploratory research, catalysis and kinetics, mechanisms, and liquefaction of synthesis gas. Other research involves studies leading to advanced liquefaction concepts. This research includes projects on hydroextraction of coal, extraction with novel solvents and supercritical fluids, the effects of specific solvent components on kinetics and liquefaction products, and acquisition of fundamental technology base data and techniques. Advanced liquefaction concepts research encompasses development of new analytical techniques for coal conversion processes.

The following accomplishments are representative of progress in this program in FY 1983: (1) completion of a comparison of hydrogen utilization during coal liquefaction in terms of matrix bond breaking, heteroatom removal, and hydrogen pathways as a function of coal type; (2) characterization of fractions of the components of high boiling two stage liquefaction recycle solvent in terms of coal dissolution promotion and minimization of regressive reactions; and (3) development of an empirically derived correlation that will relate liquefaction behavior of high sulfur bituminous coals to coal characteristics such as geological antecedents and chemical structural features.

In FY 1984, this activity will continue to focus on development of research areas to meet longer term needs. These needs involve essential studies on the controlling parameters in coal liquefaction and advanced catalysis. The effort to develop a better understanding of coal liquefaction, reactions of synthesis gas, effects of mineral matter in coal and exploration of advanced concepts will continue in FY 1984. In addition, projects will be continued in the areas of coal structure and its correlation with liquefaction behavior and characterization of synthetic liquids, which includes fundamental thermodynamic and thermophysical properties.

Gasification	$ 3,375	$ 3,150	$ -225

The FY 1984 budget request provides for research on coal conversion processes to advance gasification and novel concepts. This activity is characterized by R&D efforts along a broad technical front involving kinetics, thermodynamics, catalytic mechanisms, modeling, hydrogasification, pyrolysis, fluidization studies, acid gas removal, hot gas cleanup, gas separation, conversion studies, and novel concepts of gas generation by reaction of coal with steam, air, and oxygen.

Each of the projects in this activity will generate technical data to advance the state-of-the-art in coal gasification in key areas or to solve recognized problems. In addition, a large fraction of the projects are related to other projects in advanced gasification technology development. These include, for example, projects in catalytic gasification to elucidate fundamentals in catalytic reaction processes, and projects on pollutant control and waste water treatment, which complement the ongoing exploratory process development unit efforts.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Direct utilization	$10,600	$ 4,800	$ -5,800

The FY 1984 request for direct utilization will continue efforts pertaining to the technology base for increased utilization of coal including low ranked coals, chars, beneficiated coals, and coal-liquid mixtures. The goal of the program is to continue the evolution of the technology base required for assessment, selection, and development of appropriate advanced concepts by the private sector. The approach focuses on the further understanding of those basic chemical and physical phenomena critical to the performance of combustion equipment and the development of the data base and predictive modeling approaches required by the industrial equipment designer. The program strategy is to ensure relevance and technology transfer by involving equipment manufacturers, along with universities and industrial and Federal research organizations, in the planning and execution of integrated projects in fundamental combustion research.

In FY 1984, work in the area of coal combustion will be continued, but at a reduced level. The coal combustion program is an integrated effort composed of approximately 50 individual contracts addressing the areas of fuel injection and preignition processes, flame chemistry, pollutant formation and control, fouling and slagging, and modeling and scaling techniques. The program will include work relating to improved combustion processes for fluidized-bed technology. Specifically, the activity will relate to efficient combustion of lower grade fuels, particularly the rejects from cleaning processes. It will also address new concepts and means of reducing emissions well below projected standards, and the fundamental understanding of combustion phenomena in a fluidized-bed. During FY 1984, a data base will be improved on the combustion characteristics of beneficiated coals. These data could assist private companies in establishing equipment design strategies and in determining coal cleaning/system performance tradeoffs.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Materials and components	$ 7,800	$ 6,500	$ -1,300
Materials	$ 6,940	$ 5,500	$ -1,440

The AR&TD Materials Program is directed toward the development of a generic technology base for materials utilized in fossil energy systems. Conditions in the coal liquefaction, gasification, combustion, and oil shale processing systems under development by DOE are considerably different from those found in conventional energy systems. These advanced technologies encounter unusually high rates of sulfidation corrosion which is aggravated by erosion caused by the presence of solid matter. Similarly, the presence of high hydrogen partial pressures at higher than normal temperatures, in conjunction with sulfur species, presents new aspects of hydrogen attack which are not well understood and must be studied. The significance of these materials problems is confirmed by the numerous reported materials failures in pilot plants which have caused premature plant shutdowns and which may reduce the potential efficiency of future plants.

Past AR&TD research was primarily directed toward identification of materials which functioned best in specific coal conversion environments. The current research effort is directed toward an understanding of mechanisms of deterioration in situations common to a variety of fossil fuel applications. Continued research in these areas will provide a broad basis of understanding which will be applicable to not only current technologies but also to future variations of fossil technologies. Specific activities to be addressed in FY 1984 include:

o Slag/refractory interactions - Mechanisms of deterioration of refractory linings in gasifiers and boilers will be better understood and will allow the design of liners with improved chemistries and microstructures.

- Hydrogen effects - Modeling of the reaction of hydrogen with carbide constituents of low alloy steels will provide an increased ability to tailor compositions and microstructures for resistance to hydrogen attack.
- High Temperature Corrosion - Delineation of the mechanisms of sulfidation attack in terms of temperature cycling, environmental fluctuations, applied stress and deposit chemistries will enable rational guidelines to be established for alloy chemistries and protective coating compositions useful in conversion and combustion environments.
- Structural Ceramics - Mechanisms of fracture in structural ceramics and ceramic composites as well as effects of processing on mechanical and chemical properties will be investigated to provide the understanding necessary for long-term development of materials with superior properties at elevated temperatures.
- Erosion/wear - Investigations of the mechanisms of wear and abrasion will allow the development of microstructures with improved properties for a variety of applications where solid impingement accelerate deterioration.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Components	$ 860	$ 1,000	$ +140

Coal gasification facilities presently in operation (PDU's, pilot plants, and commercial plants) have been constructed from experience gained in fossil and petrochemical fueled power plants. The developers and operators of these facilities have experienced continuing difficulties with component reliability resulting in excessive startup periods, costly down times and the need to utilize expensive back-up systems to achieve acceptable periods of operation. The goal of this work is to enhance industry's capability to produce reliable, efficient, versatile, and economic plants through the study and development of the advanced concepts that have the potential to be further developed into operating systems.

In FY 1984, research and development studies will be continued on novel, advanced dirty gas valve concepts such as power fluidics, and multiple orifices. The design methodology required to improve the hydrodynamics design of dirty gas valve internal flow passages to reduce erosion, minimize or prevent solids deposition and to facilitate on-line removal of solids will be studied. The work on slurry pumps will be continued through the study and improvements of such critical subsystems as check valves, mechanical seals, configurations, and materials for stuffing boxes, and new liquids and liquids distribution systems for cooling or flushing systems. The work on advanced heat exhange concepts for dirty gases will proceed with the work to develop sophisticated fouling detectors that can be used to correlate the fouling tenedency of dirty gases and thus provide indications of treatment or replacement requirements. This work will also include the further study of the novel heat exchange concepts identified during FY 1983. The feasibility of advanced concepts such as ceramic tube, direct contact, regenerative processes and fluidized bed heat exchangers will be studied and the merits established. These studies will provide an integrated approach for identifying and addressing research and development needs to assure an adequate technology base for components that will permit safe, reliable, and economic operation of gasification plants.

Program development and coordination

Operating expenses	$ 3,000	$ 1,700	$ -1,300
Construction	2,800	5,040	+2,240
Total	$ 5,800	$ 6,740	$ +940
Budget and administration Construction	$ 2,800	$ 5,040	$ +2,240

The FY 1984 request for $5,040,000 in construction funds will provide $2,000,000 for general plant projects at the Energy Technology Centers and $3,040,000 for two specific line item construction projects.

The request for general plant projects (GPP) of $2,000,000 provides for capital construction items which are not of sufficient size to constitute separate line items, yet are essential to the safe, efficient operation of the Energy Technology Centers. The funds are dedicated to a number of improvements, alterations, and additions at each of the Centers, and to provide for orderly phase out and mothballing of some smaller facilities. Additional projects include, but are not limited to OSHA health and safety requirements, modifications to meet environmental requirements, proper equipment storage facilities, roof replacement/repair, boiler replacement/repair and other renovation of facilities to provide for safe, efficient use of existing space.

The $1,040,000 provides incremental funding for the construction and initial equipping and operation of a surface water containment and waste water treatment facility at the Pittsburgh Energy Technology Center (PETC) in Bruceton, Pennsylvania, in order to correct a current violation of waste-discharge regulations. Work on this project was initiated in FY 1982 to achieve compliance with the Federal Water Pollution Control Act of 1977, Sections 301, 311, and 402—which mandate installation of the best available control technology not later than July 1, 1984—as well as similar State and county environmental regulations. The proposed facility will receive waste water from the PETC laboratory. Initially, this waste water facility was to treat the waste water stream from the entire Bruceton Research Center. Subsequent events have reduced the treatment scope and have required a site change to a less desirable location and at a higher elevation. The additional site preparation, pumping, and piping required by the changed site has caused the overall cost of the facility to remain at the original estimate of $3,000,000. The facility will be constructed on land owned and maintained by the U.S. Government. This funding request will provide for the engineering, design, inspection, and construction of this facility.

Funds of $2,000,000 are requested for a waste water treatment facility at the Morgantown Energy Technology Center (METC). This project provides for the design and construction of a new industrial waste water treatment plant for the METC complex in Morgantown, West Virginia. METC is required to meet effluent permit limitations under the National Pollution Discharge Elimination System program of the Clean Water Act. METC holds an interim discharge permit which expired in December, 1981. A request for extension was forwarded in that month in order to avoid non-compliance action and verbal authority was given to continue operations. Engineering plans for construction of a new facility will be prepared and submitted to comply with the Act. The total estimated cost of the facility is $5,300,000. The balance of funds to complete this facility will be requested in subsequent years.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Environmental activities	$ 2,000	$ 1,000	$ -1,000

The FY 1984 request will provide funding for policy development and refinement, R&D assessment and compliance overview in the areas of environment, safety and health (ES&H). This environmental effort will provide a policy and management framework for ensuring that environmental, safety, and health considerations are properly integrated into Fossil Energy programs, and that projects and programs are conducted in compliance with environment, safety and health (ES&H) laws and requirements. This includes analyses on broad issues such as acid rain that have potential impacts on Fossil Energy R&D programs. This activity also provides guidance and assistance to program and project managers in order to expedite compliance with project-related ES&H requirements. Major functions of the environmental activities area are the overview of programs to assure that facilities and projects comply with the National Environmental Policy Act, Clean Air Act, the Occupational Safety and Health Act, and other relevant legislation, as well as Department of Energy regulations. Also, these environmental activities will enable analysis and participation in the formulation of agency-wide positions on the impact of potential or proposed ES&H legislation and regulations on fossil energy technologies. Efforts will include the establishment of program directives in health and safety areas to implement DOE orders and overall environmental planning during the initial technology planning stages. These broad environmental activities will enable Fossil Energy to assure the environmental acceptability of technologies within the Fossil Energy program.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Planning and policy	$ 1,000	$ 700	$ -300

The FY 1984 funding request will provide necessary funding for the planning and policy formulation required due to the continuing evaluation of the priorities of the Fossil Energy Research and Development Program. The planning and policy activities provide a framework and supporting analyses to ensure that Fossil Energy activities are prioritized in a manner consistent with important criteria such as potential National economic and security benefits and the appropriate Federal role. These funds will be utilized to conduct contract studies and data collection on various Fossil related topics. The results of these studies and data collection will be input to the R&D planning efforts for the outyears.

University coal research	$ 2,750	$ 4,000	$ +1,250

The FY 1984 request will support initiation and/or renewal of approximately 25 university projects which are directed towards improving the fundamental scientific and technical understanding of the chemical and physical processes involved in the conversion and utilization of coal and to discover new approaches to coal conversion and utilization. The general fields of research will include coal science, surface science, organic and inorganic chemistry of coal constituents, and the mechanisms, kinetics, thermodynamic and transport properties important to gasification, liquefaction, and combustion. Specific research topics will be chosen with the assistance of researchers from both within and outside the government.

The University Coal Research program differs in several respects from other FE activities with universities in the line programs. First, it is a grant program and supports somewhat longer-term and more fundamental projects than those supported in other Fossil Energy programs. Second, it includes training of students and scientists. Third, grants are awarded based on the results of an annual competition, with proposals rated simultaneously by specialized evaluation panels.

University/industry collaboration will be encouraged in a number of ways, depending on the research area. Examples include joint projects with industry arranged by university faculty members, periodic visits between university and industry staff, contractor progress meetings, and exchanges of personnel for time periods up to one year.

Capital equipment	$ 1,500	$ 1,500	$ ...

The FY 1984 request provides for the centralized funding of the capital equipment needs in all the Fossil Energy R&D activities conducted at the Energy Technology Centers and National Laboratories. Equipment purchased will replace obsolete equipment, thereby upgrading the analytical capabilities of the Energy Technology Centers. New state-of-the-art diagnostic instrumentation which will dramatically improve the Energy Technology Centers capabilities will also be acquired. Examples of such equipment are as follows: specialized analytical instruments for determining the composition of gases and liquids such as chromatographs, spectrometers, x-ray diffraction equipment, particulate analyzers, sulfur detectors, high-resolution spectrophotometer, waste water stripper, and a microtox analyzer. General purpose laboratory and supporting equipment would also be funded.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Advanced Research and Technology Development

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Processes - Liquefaction	Continued research efforts into fundamental phenomenological studies in coal science and liquefaction with emphasis on catalysis, kinetics, mechanisms and liquefaction of synthesis gas.	Initiate studies in coal structure and its correlation with liquefaction behavior and characterization of synthesis liquids.
Processes - Gasification	Continued research to develop a more thorough understanding of novel gasification concepts, chemistries, and processes.	Conduct pioneering R&D efforts related to advanced gasification concepts: kinetics, thermodynamics, catalytic mechanisms, pyrolysis, hydrogasification, acid gas removal, and hot gas cleanup.
Direct Utilization	Continued research in the area of coal combustion. Initiated development of a data base related to the combustion characteristics of beneficiated coals.	Conduct activities related to coal combustion to address the following areas: fuel injection, fouling and slagging, and pollutant formation and control.
Materials and Components - Materials	Initiated studies related to the ceramic fiber research program. Continued studies to better understand the mechanisms of deterioration of materials in specific fossil fuel applications.	Continue studies related to slag/refractory applications. Continue activities related to hydrogen effects and high temperature corrosion.
Materials and Components - Components	Continued fundamental research and development into component reliability.	Continue research activities into novel, advanced gas valve concepts, slurry pumps, and heat exchange concepts.
Program Development and Coordination	Continued FE policy development and formulation as well as environmental, safety, and health reviews of FE programs and technologies. Provided for general plant projects at ETC's as well as waste water treatment facilities at METC and PETC.	Continue general FE policy development, planning and re-evaluation of FE priorities. Continue to support R&D assessment and overview of environmental, safety and health issues. Continue to provide for GPP's at the ETC's and for design, construction, and initial equipping of waste water treatment facilities at METC and PETC
University Coal Research	Continued basic coal research conducted at universities funded by prior-year appropriations.	Initiate 25 university coal research grants designed to improve the fundamental understanding of coal.
Capital Equipment	Provided for centralized funding of basic capital equipment requirements of the ETC's and national laboratories.	Continues to provide for centralized funding of basic capital equipment requirements of the ETC's and national laboratories.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Coal liquefaction (FE)				
Direct hydrogenation:				
H-Coal pilot plant				
Operating expenses	$22,080	$ ...	$ ...	$ ...
Subtotal	22,080	...	...	...
Solvent extraction:				
Exxon doner solvent pilot plant				
Operating expenses	28,800	...	...	...
Subtotal	28,800	...	...	...
Indirect liquefaction:				
Operating expenses	11,520	12,600	12,600	4,000
Subtotal	11,520	12,600	12,600	4,000
Advanced process development:				
Disposable catalyst hydrogenation				
Operating expenses	4,800	7,200	7,200	4,000
Pyrolysis and hydropyrolysis				
Operating expenses	5,184	...	...	...
Process research/technology development				
Operating expenses	17,472	10,800	10,800	5,000
Subtotal	27,456	18,000	18,000	9,000
Support studies/engineering evaluations:				
Environmental studies and other support				
Operating expenses	8,256	5,000	5,000	4,000
Subtotal	8,256	5,000	5,000	4,000
Alternate fuel feasibility study:				
Operating expenses	...	2,000	2,000	...
Subtotal	...	2,000	2,000	...
Total				
Operating expenses	98,112	37,600	37,600	17,000
Capital equipment	672	...	...	...
Coal liquefaction	$98,784	$37,600	$37,600	$17,000
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$ 37,600

Program increases and decreases:

Indirect Liquefaction

o Terminate activities at the liquid phase methanol process development unit. Reduce investigations of advanced concepts involving new catalysts and reactor designs	-8,600

Advanced Process Development	
o Disposable catalyst hydrogenation - Phase out development and integrated bench scale studies of slurry phase catalysts	-3,200
o Process research/technology development - Phase out proof-of-concept testing of advanced liquefaction processes	-5,800
Subtotal	$-9,000
Support Studies/Engineering Evaluations	
o Reduce health effects research. Reduce critical component development	-1,000
Alternate Fuel Feasibility Study	
o Feasibility study will be completed in FY 1983	-2,000
FY 1984 budget request	$17,000

Coal liquefaction:

Goals/Objectives:

The goal of the Coal Liquefaction program is to contribute to a data base that will facilitate the private sector's development of coal conversion processes for economical production of environmentally acceptable synthetic liquid fuels through generic R&D in high-risk, long-term concepts that have potential for high payoff. Specific objectives are to:

- Aid the development of new and improved indirect liquefaction technology to produce liquid fuels from coal.
  - Perform feasibility tests on synthesis gas with a hydrogen to carbon monoxide ratio below 1.0.
  - Seek single pass conversion of synthesis gas to fuels greater than 60 percent.

- Aid the development of more advanced direct coal liquefaction processes for further private sector development and demonstration.
  - Yield objectives are 10 to 15 percent above the yields from corresponding second generation processes.
  - Quality objectives are a 40 to 50 percent reduction in heteroatom content and/or up to 10 percent increase in hydrogen content in the liquid product compared to corresponding second generation processes.

- Obtain supporting data in the areas of environment and health effects, key instrumentation and components, engineering analyses and data base management to maximize value to industry of Federal funded activities in coal liquefaction.

Products obtained from coal liquefaction processes can replace petroleum derived products as boiler fuel for utilities or be refined to transportation fuel, furnace oils, and chemical feedstocks. Coal is, by far, the largest domestic fossil energy resource available to the U.S. In order to meet the future energy requirements of this country, it will be necessary at some point to use this resource base to increase the supply of liquid fuels.

It is anticipated that an indirect liquefaction industry may be initiated through incentives provided by the Synthetic Fuels Corporation (SFC). However, at the present state of development, many indirect liquefaction processes are high cost and have relatively low thermal efficiencies. Direct liquefaction promises lower costs and improved thermal efficiencies. The technical viability of a limited number of direct liquefaction processes has been demonstrated but commercial application has not yet occurred.

Research and development leading to innovative improvements in the present state-of-the-art will be necessary to improve the market potential of these technologies. With high uncertainty in supplies and prices in the international petroleum market, the private sector will not undertake the long range, high risk R&D required to develop these improvements--particularly in the absence of an existing industrial production capacity and market which can provide sufficient profit incentives.

The coal liquefaction program in FY 1984 supports longer range and high risk research and development activities with the objective of aiding industry to develop lower cost, more efficient liquefaction technologies which can utilize the entire U.S. coal resource base. Selected innovative concepts that are inherently more selective and efficient and that can achieve higher thermal efficiencies by reducing the amount of steam, oxygen and/or hydrogen required, will be emphasized.

FY 1983 Accomplishments:

Indirect Liquefaction

- Operated methanol-to-gasoline (MTG) pilot plant in external cooling mode.
- Performed bench scale testing of improved synthesis catalysts in liquid phase system.
- Constructed liquid phase methanol process development unit.

Advanced Process Development

- Operated bench scale unit to define impact of selective ash separation in feed coal yield and explored inexpensive catalysts with better hydrogenation or heteroatom removal capabilities.
- Continued some lab scale exploration of impact of improved synthetic catalysts and variation in prereactor/reactor combinations.
- Completed test of sub-bituminous coal in integrated bench scale two-stage liquefaction unit and explored improvements in solid/liquid separation step and in second stage hydrogenation unit.
- Tested different coals in integrated two-stage process bench scale unit to define preferred conditions in first and second stage.
- Completed coal liquid stability tests and analyzed feasibility and cost of hydroprocessing liquids produced in bench scale two-stage liquefaction process.
- Completed proof of concept testing of an integrated two-stage liquefaction configuration on a bituminous coal (Wilsonville).

Support Studies/Engineering Evaluations

- Completed research guidance study on direct catalytic liquefaction research to assess potential for economic improvement over state-of-the-art and identify the most promising technical approaches.
- Completed chemical characterization and initial screening for health effects of hydrotreated coal liquids.

Alternate Fuel Feasibility Study

- Executed multinational agreement to study coal-to-methanol plant in Panama.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Indirect liquefaction	$12,600	$ 4,000	$ -8,600

The indirect liquefaction subactivity has used a combination of laboratory, bench, and PDU scale efforts to develop new and improved methods of converting H_2/CO mixtures to liquid hydrocarbons. This can provide an attractive way of producing high quality liquids from coal.

The existing commercial Fischer-Tropsch process was first conceived in the 1930's, and while evolutionary improvements have been made, the commercial process still has severe inherent limitations. A broad based catalyst and process R&D program is now in place with a primary goal of developing this substantially improved indirect liquefaction technology for application with the low ratio H_2/CO gas produced by modern gasifiers and in particular, those marketed by U.S. industry. Reactor designs that enable the reaction temperature to be closely controlled and the exothermic heat of reaction to be recovered are also part of the program.

During FY 1983, operations were continued at the 100 barrel per day fluidized bed MTG pilot plant in collaboration with the Federal Republic of Germany (FRG). Data and licensing provisions in the governing agreement assure that the results of the pilot plant operation will be available to U.S. industry. New shape selective catalysts and bifunctional catalysts were tested in the laboratory as part of the evaluation of approaches to more selectively produce desirable liquid fuels. Construction of the liquid phase methanol process development unit at La Porte, Texas was nearly completed in order to provide engineering proof of an advanced process concept. The Office of Fossil Energy will also explore opportunities with private companies and non-Federal institutions for future uses of the unit with their funds.

The FY 1984 budget request will permit completion of funding for the MTG pilot plant project in collaboration with the FRG. Data will be obtained from continuing bench scale research with new catalyst systems and process concepts. The liquid phase methanol project with the PDU at La Porte, Texas, will not be continued since it represents pilot scale research.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Advanced process development	$18,000	$ 9,000	$ -9,000

The objective of this subprogram is to develop innovative improvements that have the potential for yielding significant cost reductions in direct liquefaction technology.

Process development activities for the near term direct liquefaction technologies, such as SRC, H-Coal, and EDS, have reached the stage where these technologies can now be considered technically ready for large scale demonstration by the private sector. However, further improvements are required in the present state of the art of direct liquefaction technology to lower the cost of coal derived liquids.

Based on previous research, feasible improvements have been identified and the advanced process development subprogram seeks to exploit these improvements by developing liquefaction approaches that have lower hydrogen consumption, higher liquid yields, higher quality products, improved unit operations and greater flexibility in feed coal and product slate selection. Elements of the program include slurry phase (disposable) catalyst hydrogenation and process research. Activities are to be conducted at the laboratory and bench unit scale.

Disposable catalyst hydrogenation	$ 7,200	$ 4,000	$ -3,200

Funding for this activity in FY 1983 supported work in improved concepts and catalyst development in direct catalytic liquefaction and in the use of slurry phase (disposable) catalysts to improve liquefaction processing.

Direct catalytic liquefaction utilizes an ebullated bed catalytic reactor in a single stage to produce high quality coal liquids. The catalyst plays a central role in controlling hydrogen consumption, product yield and product quality. Accordingly, catalyst development is a major element of this activity. In addition, innovative concepts involving slurry oil composition and preheater/prereactor performance are being investigated. These projects are being conducted in bench scale facilities.

During FY 1984 efforts will be continued toward the development of new bead catalysts for coal liquefaction. These studies will focus on establishing the aging characteristics of the most promising catalysts previously developed. Improved direct catalyst liquefaction process concepts will be evaluated. The major focus is on the development of a preheater/prereactor concept to improve the ebullated bed catalytic reactor performance. Integrated bench scale testing of the promising results of the work will be continued. These test runs are considered essential for results validation and to provide feedback information. An evaluation of the economic impact(s) due to improved catalysts and process configuration will also be performed.

It has been well established that naturally occurring mineral matter in coal, particularly iron compounds, are active catalysts for promoting coal dissolution and hydrogen transfer in direct coal liquefaction processes. The concentration of these minerals and their catalytic activity shows wide variability in coal.

The objective of the disposable catalyst program is to develop active, cost effective disposable catalysts which can be slurried with the coal before reaction to augment the intrinsic catalytic activity that is present. Successful development of such catalyst systems will lead to: lower costs by improved yield and reduced hydrogen consumption as a result of less severe operating conditions; improved reactivity of low reactivity coals to expand the usable coal resource base; and improved economics of short residence time (very low severity) liquefaction processing to provide a heavy coal extract for upgrading to liquid fuels by an adaptation of conventional heavy oil hydrocracking technology.

In FY 1984, work in the disposable catalyst will focus on the use of slurry catalysts in low severity coal dissolution to improve extract reactivity and deashing performance of these difficult to deash low severity extracts. Efforts will continue in the evaluation of slurry phase catalysts in the liquefaction of low rank coal.

The reduction of $3,200,000 from FY 1983 to FY 1984 in this budget element is due to the phase out of work on development and evaluation of inexpensive synthetic catalysts. Integrated bench scale testing of slurry phase catalysts is not included in the FY 1984 request.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Process research/technology development	$10,800	$ 5,000	$ -5,800

Funding for this activity has supported work in innovative concepts, advanced process development and engineering development leading to improvements in coal liquefaction technology. Major subactivities include: improved concepts and catalyst development in direct catalytic hydroliquefaction; advanced development in integrated two-stage liquefaction; engineering development applicable to all liquefaction processes; and the operation of an integrated proof-of-concept process development facility.

In FY 1984, program activities will focus on bench scale research in Integrated Two Stage Liquefaction (ITSL). This process concept is farthest along in the development cycle and shows considerable promise in overall cost reduction, process flexibility, and product quality enhancement.

Integrated Two-Stage Liquefaction is a process in which low severity coal extract is produced in the first stage, the effluent is deashed, and the deashed product is then upgraded in a second stage expanded bed hydrocracker to clean distillate fuel oils. This concept physically separates the two main functions in coal liquefaction, coal depolymerization (solvation) and coal fragment upgrading. The first stage is operated at the minimum severity that will allow the subsequent deashing step to operate. This results in very low H_2 consumption and light hydrocarbon gas yield. The deashing step rejects the ash and the most refractory and unreactive portion of the coal prior to its consuming any significant amount of H_2. The deashed product is then upgraded to a combination of naphtha and high quality fuel oil in a selective ebullating bed hydrocracking step. Liquid product yields of more than 3 bbls/ton using less than 4 percent H_2 have been achieved. Operation at higher severity increases the H_2 consumption to 4.5 percent, but fuel oil quality is very high with nil sulfur, <0.1 percent oxygen and <0.2 percent nitrogen. The minimum hydrogen consumption required for product specifications will be determined for sulfur, ash, and nitrogen levels to meet current standards for use as fuel. Supporting advanced research studies will be performed on low severity extract process variables, product quality and behavior, and on novel catalysts in batch and continuous bench scale units. The ITSL bench scale unit is operated by Lummus/Cities Service and contains a small diameter short contact time liquefaction coil, a Lummus antisolvent deasher and LC-Finer small bench scale ebullating bed hydrotreater.

Major efforts in FY 1984 will focus on evaluation of changes in process configuration and operating conditions to reduce capital cost and improve operability. Included is a further reduction in first stage operating severity by lowering the operation temperature and/or pressure which may require the use of slurry catalysts. Also, higher activity catalysts will be evaluated to increase throughput in the second stage catalytic reactor.

Funding for operation of a process development facility (Wilsonville - owned by EPRI) is not included in this budget request. Basic proof-of-concept tests on a bituminous coal will be completed by the end of FY 1983, and any further testing at Wilsonville will be the responsibility of EPRI and any interested private sector party. This accounts for the $5,800,000 reduction in this budget element from the FY 1983 funding level. Work on improved concepts and catalyst development in direct catalytic liquefaction will be covered by the disposable catalyst element of this budget line in accordance with the FY 1983 appropriation.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Support studies/engineering evaluations	$ 5,000	$ 4,000	$ -1,000

These projects support the overall coal liquefaction program and include studies applicable to all of the technologies under development. The studies include independent technical status reviews, engineering assessments, ancillary processing studies and evaluations such as hydrogen generation, environmental and toxicology R&D and coordination of environmental data. Also included is data base management and analysis to capture all the information from previous test and design studies and to make data from ongoing studies useful and available to industry.

Certain components of coal-derived liquids exhibit toxic properties with laboratory animals, as do components of coal tars. A coordinated biomedical testing program has been underway with the Department's Office of Energy Research. The undesirable components are being characterized and efforts are being made to evaluate techniques to mitigate toxic effects in a manner compatible with liquefaction processes. Previous work has provided environmental/biomedical assessments of material from two-stage liquefaction processes and have identified the boiling point range of certain coal liquids below which mutagenic activity was not observed. In FY 1983, health effect characterization work was extended to identify the specific classes of organic compounds that are most active biologically. This information will be useful to industry's development efforts in identifying how changes in process configuration or operation might reduce or eliminate these undesirable species and better assure product marketability from industry's future plants. In FY 1984, characterization of typical finished product liquids will be undertaken.

R&D is needed to help improve selected key mechanical components such as pumps and valves identified as critical problem areas for large scale operations. A data exchange program to collect and evaluate component performance from operating liquefaction facility was completed in FY 1983. In FY 1983, further detailed analysis of this operating data was conducted to provide a comprehensive technical data base on component performance.

In FY 1984, the program will continue to evaluate innovative improvements that industry could make in critical components such as slurry flow meters, let down valves, slurry pumps and slurry level detectors.

Experienced engineering firms review and appraise the technical status and ultimate commercial feasibility of new processes under consideration for study to help assure that only the most promising candidates are supported. In FY 1983, a concerted effort included analysis of data from the two large pilot plant facilities (H-Coal and EDS). This analysis can establish a strong data base on these technologies which will be useful for future development by industry as well as provide a credible yardstick with which to measure the performance of the new concepts being developed. Limited economic and engineering studies will continue in FY 1984 to provide research guidance for further development. In particular, significant new data will be available from the experimental evaluations of advanced concepts that will allow a more meaningful evaluation of their potential.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Alternate fuel feasibility study	$ 2,000	$ ...	$ -2,000

Consistent with FY 1983 appropriations guidance, a multinational cooperative agreement was executed to perform a feasibility study for an indirect (coal-to-methanol) liquefaction plant in Panama. The project concept proposes to produce fuel-grade liquid methanol from coal using known technology for coal gasification and methanol synthesis. Coal exported from the Midwestern United States would be the principle feed stock. The cost was jointly shared by Japan (50 percent), the United States Government (25 percent) and private industry (25 percent). The Department's share of the funding ($2,000,000) was transferred from the Alternate Fuels Production appropriation. The feasibility study of the Panama methanol project will be completed without additional funding in FY 1984.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Coal Liquefaction

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Indirect Liquefaction	Continued construction of the liquid phase methanol PDU at at La Porte, TX. Operated the methanol-to-gasoline (MTG) pilot plant in external cooling mode. Performed bench scale tests of improved synthesis catelysts in liquid phase system.	Continue operation and data acquisition from MTG pilot plant in collaboration with the Federal Republic of Germany. Continue research and data acquisition from bench scale activities related to new catalyst systems and process concepts. Discontinue support of the liquid phase methanol project.
Advanced Process Development	Continued activities directed towards determining the interaction of mineral matter components in coal liquefaction processes. Continued research to develop catalysts which reduce hydrogen consumption and increase liquid yields. Completed proof-of-concept testing of integrated two stage liquefaction process with a bituminous coal. Completed test of a sub-bituminous coal in integrated bench scale two stage liquefaction unit.	Continue research into the application of slurry phase (disposable) catalysts to improve staged coal liquefaction. Continue studies to develop bead catalysts. Continue evaluation of direct catalyst liquefaction process concepts. No planned activities for the Wilsonville PDU, an integrated proof-of-concept facility. Continue bench scale research in the integrated two stage liquefaction process.
Support Studies/ Engineering Evaluation	Completed studies related to chemical characterization/toxicology of coal-derived liquids related to potential adverse health effects. Developed a data exchange program to collect/evaluate component performance data from operating facilities.	Continue activities related to characterization of health effects of finished product liquids. Continue program to evaluate improvements available in liquefaction components.
Alternate Fuel Feasibility Study	Entered into a multinational agreement to participate in a feasibility study of a coal-to-methanol plant in Panama.	Complete feasibility study of the coal-to-methanol plant in Panama.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Combustion systems (FE)				
Atmospheric fluidized bed combustion:				
AFB technology development				
Operating expenses	$ 8,788	$ 650	$ 650	$ ...
AFB advanced concepts				
Operating expenses	2,016	3,550	3,550	1,000
Subtotal	10,804	4,200	4,200	1,000
Pressurized fluidized bed combustion:				
PFB combined cycle pilot plant				
Operating expenses	14,688	5,500	5,500	...
PFB support/IEA				
Operating expenses	9,312	7,500	7,500	3,400
PFB alternate turbine testing				
Operating expenses	960	...	...	...
Subtotal	24,960	13,000	13,000	3,400
Advanced combustion technology:				
Coal combustion support and engineering evaluations				
Operating expenses	1,056	3,000	3,000	...
Subtotal	1,056	3,000	3,000	...
Alternative fuel utilization:				
Alternate fuel mixtures				
Operating expenses	4,224	4,000	4,000	4,000
Subtotal	4,224	4,000	4,000	4,000
Total				
Operating expenses	41,044	24,200	24,200	8,400
Capital equipment	...	...	...	...
CTIU unobligated funds	-10,500	...	...	...
Combustion systems	$30,544	$24,200	$24,200	$ 8,400
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$24,200
Program increases and decreases:	
Atmospheric Fluidized Bed Combustion	
o Support bench-scale testing of AFB advanced concepts and complete AFB technology development work	-3,200
Pressurized Fluidized Bed Combustion	
o Complete DOE participation in the combined cycle pilot plant in FY 1983	-5,500
o Restrict data base effort to existing operational rigs and obtain final reports from IEA/Grimethorpe	-4,100
Subtotal	$-9,600

Advanced Combustion Technology

o Complete all work in this area of technology development	-3,000
FY 1984 budget request	$ 8,400

Combustion systems:

Goals/Objectives:

The objective of the Combustion Systems activity is to conduct generic technology base development with potential for high risk/high payoff related to advanced coal and coal derived fuel combustion concepts. These research efforts are intended to establish the technology base from which industry can develop, demonstrate and commercialize improved systems which can allow for the expanded utilization of coal in an environmentally acceptable manner; particularly, as a replacement for oil and/or natural gas in utility, industrial, residential/commercial and transportation applications. The programs involve generic research on atmospheric and pressurized fluidized bed combustion and alternate fuel mixtures.

In prior years, research and development efforts on atmospheric fluidized bed (AFB) combustion has resulted in the demonstration of this technology in industrial applications on a variety of fuels including anthracite culm. In FY 1982, the demonstration activities were brought to a logical conclusion, with further commercialization and technology improvements being pursued by private industry. In FY 1983, data collection and dissemination continued and investigation continued on lignite and low rank coals. The FY 1983 efforts on pressurized fluidized bed (PFB) combustion concentrated on base technology and the completion of U.S. participation in the International Energy Administration (IEA) Grimethorpe test facility.

The alternative fuel utilization program objective is to establish the technology base, particularly in the area of combustion phenomena, for coal based slurries such as coal water and coal-water-alcohol, and other coal-liquid mixtures. The objective is to define the effect of coal particle size and distribution in a slurry fuel on combustion phenomena over a range of coal-based mixtures and combustion applications; and to identify and provide the fuels technology that could lead to the development of these alternative fuels as a replacement for oil and gas in both retrofit and new applications. It is estimated that the fuel displacement potential could exceed 3,000,000 bbls/day if these programs are implemented by the private sector.

The advanced combustion technology program objective is to direct fire coal and coal based mixtures in oil/gas designed, existing or new boilers and process heaters with minimum derating via a precombustion deashing concept.

FY 1983 Accomplishments:

- Completed operation of industrial AFB boiler demonstrations at Great Lakes.
- Initiated construction of two AFB boilers - East Stroudsburg and Wilkes-Barre.
- Completed evaluation of advanced AFB concepts.
- Continued construction of PFB pilot plant with increased private industry cost sharing.
- Continued operational testing/data collection of IEA/Grimethorpe PFB test facility.
- Awarded contracts for advanced PFB concepts.
- Completed construction and shakedown of New York University test rig.
- Continued PFB testing/data collection at Coal Utilization Research Lab and Long Term Materials Test Facility.
- Awarded two contracts and initiated testing to characterize coal water slurries.
- Continued development of technology in other coal base fuels.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Atmospheric fluidized bed combustion	$ 4,200	$ 1,000	$ -3,200
AFB technology development	$ 650	$ ...	$ -650

No funds are requested for the AFB Technology Development project. In FY 1982 and FY 1983 the demonstration units were fully funded and work was completed. The operational phase of the Georgetown, Shamokin and Great Lakes projects have also been completed. During FY 1983, technology base development work will continue in areas of data analysis and collection.

AFB advanced concepts	$ 3,550	$ 1,000	$ -2,550

The focus of the AFB Combustion program is to investigate innovative fluidized bed combustion (FBC) technologies which represent a better way to burn coal-based fuels and other materials if this technology is to achieve significant commercialization in the industrial and commercial sectors. They are advantageous in the sense that they will meet future environmental standards and achieve potentially lower life-cycle costs than current systems because of the choice of feedstock and/or combustion system designed to handle the feedstock.

In FY 1983, engineering studies and evaluations were continued on the most promising advanced AFB concepts. The FY 1984 budget request will allow bench scale testing on one of the previously identified advanced AFB concepts which potentially have significant technical and economic advantages over the existing state of the technology.

Pressurized fluidized bed combustion	$13,000	$ 3,400	$ -9 600
PFB combined cycle pilot plant	$ 5,500	$ ...	$ -5,500

No funds have been requested for the PFB combined cycle pilot plant in FY 1984. Private industry will be expected to bring the project to its logical conclusion. The funds provided in FY 1983 completed the Government's obligations in the cooperative agreement signed in FY 1982. Curtiss-Wright, with additional private sector cost sharing, will fund the operations phase of this project.

PFB support/IEA	$ 7,500	$ 3,400	$ -4,100

The pressurized fluidized bed (PFB) program objective is to develop PFB combustion systems that achieve high combustion efficiency and acceptable component durability and reliability while staying within acceptable emission levels. NO_x emissions are reduced below the level of AFB systems, and greater SO_2 removal is possible than with AFB systems. PFB systems also offer a considerable advantage in power output density due to combustion at elevated pressures and the recovery of work from the high temperature combustion products. These potential increased benefits are difficult to achieve due to the added complexity of the PFB versus AFB systems. Work to date, sponsored by DOE, has shown that PFB is feasible. However, considerable technology needs to be developed before the risks are reduced to the point industry would be able to initiate the commercial process. Work at the IEA Grimethorpe facility (DOE funding for this project ended in FY 1983) has provided data in the actual combustion process and performance of cyclones. Curtiss-Wright, in the small gas turbine test rig, demonstrated 1000 hours of operation of a small gas turbine operated on PFB-generated combustion products. The Coal Utilization Research Laboratory efforts have verified the ability to feed coal-water mixtures and also developed data on feeding different size coals. A long-term materials program (joint DOE, ERDA-New York, EPRI, GE) has developed a comprehensive data base in alloy performance and DOE has moved forward in FY 1983 with a solicitation to industry for new concept definition.

In FY 1984, PFB technology base activities will continue. Specifically, the long-term materials program will continue, and evaluation will be made on a wide range of coal feeds including different coal-water mixtures, lignite, and large (run of mine) coal.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Advanced combustion technology	$ 3,000	$ ...	$ -3,000

No funds have been requested for this subactivity in FY 1984. The focus of this activity is the development, through the proof-of-concept stage, of technology to enable existing and new industrial and utility boilers, designed for oil or gas, to be retrofitted with equipment to enable them to burn coal or coal-water mixtures.

In FY 1983, $3,000,000 was utilized to support several of the most promising partially developed and innovative concepts and to provide a data base which industry can use to help bring this technology to commercial readiness.

Alternative fuel utilization	$ 4,000	$ 4,000	$ ...

The objective of the alternative fuel utilization activity is to provide the technology development necessary to establish a technology base for retrofitting coal based fuels to existing oil & gas designed facilities with emphasis on coal in slurry form. This activity will provide the technology necessary for application in the utility, industrial, residential/commercial and transportation sectors. Successful development of these coal-based fuels offers enormous potential for replacing oil and gas in a 3,000,000 bbl/day plus market. The R&D effort will generate a data base sufficient for private sector assessment as to the commercial acceptability of these coal-based fuels for their site specific needs as retrofit new capacity, and/or new applications.

FY 1984 funds will be used to continue the efforts in coal-water mixtures technology research and to continue efforts in other Coal Liquid Mixture technology areas (e.g., coal-methanol/ethanol, etc.). Specific efforts include: analysis of fuel metering, atomization, and combustion systems; combustion characterization and phenomena identification; ash loading limit and combustion system definitions; emissions characterization experiments, and the affects of fuel particle size and size distribution on all system elements.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Combustion Systems

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Atmospheric Fluidized-Bed Combustion	Initiated construction of two AFB boilers - East Stroudsburg and Wilkes-Barre. Completed evaluation of advanced AFB concepts. Operation phase of the Georgetown, Shamokin and Great Lakes projects were completed.	Continue bench scale testing of only one or two advanced AFB concepts which show the most promise.
Pressurized Fluidized-Bed Combustion	Completed Federal share of the construction of the PFB pilot plant Continued operational testing/data collection of IEA/Grimethorpe PFB test facility. Initiated Request for Proposals (RFP) for advanced PFB concepts.	Continue private sector funded operation phase for the PFB pilot plant. Continue PFB technology base activities to include long-term materials research and evaluation of a wide range of coal feeds that include coal-water mixtures, lignite, and large (run of mine) coal.
Alternate Fuel Utilization	Initiated testing to characterize coal-water slurries. Continued development of technology in other coal based fuels	Continue efforts in coal-water technology research. Continue efforts in other (coal-methanol/ethanol) coal liquid mixture technology areas.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Fuel cells (FE)				
Phosphoric acid systems development:				
Operating expenses	$20,640	$17,550	$17,550	$ 3,000
Subtotal	20,640	17,550	17,550	3,000
Molten carbonate systems development:				
Operating expenses	9,600	7,500	7,500	5,000
Subtotal	9,600	7,500	7,500	5,000
Advanced concepts:				
Operating expenses	4,224	5,000	5,000	1,500
Subtotal	4,224	5,000	5,000	1,500
Total				
Operating expenses	34,464	30,050	30,050	9,500
Capital equipment	...	...	...	...
Fuel cells	$34,464	$30,050	$30,050	$ 9,500
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$30,050
Program increases and decreases:	
Phosphoric Acid Systems Development	
o Development of cell stacks and verification testing will continue with a reduced level of Government support for the "electric utility" R&D program. Government support for the "on-site" R&D program will be discontinued	-14,550
Molten Carbonate Systems Development	
o Support for advanced integrated components Research and Development will continue	-2,500
Advanced Concepts	
o Continue solid oxide technology development program and terminate the thermionics program	-3,500
FY 1984 budget request	$ 9,500

Fuel cells:

Goals/Objectives:

The objective of the fuel cell program is to assist private industry in developing a hydrocarbon fuel conversion technology to increase the cost effective, efficient and environmentally acceptable use of conventional and alternative hydrocarbon fuels.

The Fuel Cell program is part of an overall National effort in which the private sector is responsible for all the commercial demonstration and commercialization activities, the bulk of the engineering activities, and part of the technology base development. Government funding supports high risk, high payoff technology base development of the cell and stack technology components.

Fuel cells are electrochemical (not combustion/carnot cycle based) conversion systems which are highly efficient (40 percent to 60 percent), fuel flexible, modular, and environmentally benign energy producing systems.

Fuel cells have a very wide spectrum of end use applications including electric utility multi-megawatt powerplants (with or without cogeneration) and on-site multi-kilowatt cogenerating systems, transportation applications to railroad, marine, trucks and buses (which represent 35 percent of oil consumption in transportation), defense applications including remote radar stations and stationary facilities, marine and submarine systems, and mobile power supplies with low infrared and noise signatures.

The clean, and quiet operation of fuel cell powerplants permit their location at the point of both electrical and thermal energy need of stationary applications. With the powerplant installed on-site, the heat produced by the plant while generating electricity can help meet the thermal needs of the consumer with almost all of the distribution and transmission losses associated with remote power generation avoided. With cogeneration, more than 85 percent of the energy available in the fuel can be put to practical use with dispersed fuel cell powerplants. This can be compared to the average of 30 percent electrical conversion efficiency for today's conventional power generating systems. Moreover, an outstanding characteristic of all fuel cell powerplants is exceedingly low emissions (lower by several orders of magnitude) of environmentally hazardous material such as NO_x, SO_x, particulates, and hydrocarbons. For these reasons, fuel cells offer an energy conversion choice of interest to a broad sector of the economy. They have the potential of generating electricity with a wide spectrum of fuels including synthetic liquids (methanol, etc.) and gases from coal, biomass and waste. Applications of this technology can provide for wider transition to coal and biomass derived fuels when they are available. The high conversion and total fuel utilization efficiency of fuel cell powerplants will make it possible to use the more expensive synthetic fuels with the least impact on the economy.

First generation phosphoric acid fuel cells are to be used in: electric utility dispersed peaking, intermediate and spinning reserve, building total energy systems, waste fuel recovery (e.g., industrial waste hydrogen, anaerobic digestors, and solid waste), industrial cogeneration, transportation and defense applications. Because of their inherent advantages and potential, private industry has a strong incentive to continue development of phosphoric acid fuel cells.

Second generation molten carbonate fuel cells can be used in: electric utility intermediate, baseload, on-site integrated energy systems, industrial cogeneration, marine and railroad applications. Molten carbonate fuel cell powerplants can be integrated with coal gasifiers. The molten carbonate system can be bottomed with a steam or a gas turbine delivering electricity at 50 percent efficiency (coal pile to busbar). Molten carbonate fuel cell technical development trails behind phosphoric acid development by three to five years but provides a potential of increased efficiency and reduced cost.

The technical feasibility of phosphoric acid fuel cells operating at up to 47 percent electrical conversion efficiency (natural gas to busbar) has been established by testing 1 MW and 40 KW preprototype systems for 1,500 and 7,000 hours, respectively, and high pressure bench scale tests on new technology cell designs. Emphasis has been on technology improvement to reduce the cost and increase the power density and endurance of phosphoric acid powerplants, and to verify the operational feasibility in on-site and electric utility applications. The technical feasibility of molten carbonate fuel cells operating at over 60 percent electrical conversion efficiency (natural gas to busbar) has been forcasted by single cell testing. The complexity and associated capital costs of such systems is projected to be significantly less then those for first generation systems. Another advantage of such systems will be high quality waste heat for industrial cogeneration, and absorption air conditioning.

Solid oxide electrolyte fuel cells have the advantage of solid state stability and can be more easily manufactured. The operating temperature of 1800°F allows a highly efficient bottoming cycle with powerplant efficiencies exceeding 50 percent. Advanced design for a seal-less generator with internal reforming underlies the cell development.

FY 1983 Accomplishments:

Phosphoric Acid Fuel Cells

Competitive, cost shared multi-year technology development programs for electric utility powerplants will be continued in FY 1983. These development programs will be cost shared by manufacturers, user groups and other funding organizations such as the Electric Power Research Institute. Support in FY 1983 will be directed toward critical technology components and subsystems which are required for increased system life, higher power density and reduced cost. Principal accomplishments expected in FY 1983 include:

- Continue 4.8 MW preprototype project and the on-site technology development program.
- UTC Electric Utility - Full size (10 ft^2) 20 cell advanced technology (120 psia, 405°F) stack successfully completed 2500 hours. Testing continuing.
- Westinghouse Electric Utility - 25kW subscale gas-cooled stack fabricated and performance testing initiated.
- UTC 40kW Field Test - A total of seven field test powerplants deployed.
- Power operation of 4.8MW powerplant at Consolidated Edison initiated.

Molten Carbonate Fuel Cells

The molten carbonate fuel cell program is scaling up laboratory technology to full-scale. This is done in two stages: laboratory cells ranging from 4"x4" to 12"x12" are scaled into full-scale cells from 3'-4' on a side. Full-scale cells are tested in short stacks of 5 to 50 cells (5 to 100 KW). Cells and stacks are engineered to meet requirements on cost and performance based on reference designs developed in conjunction with utility and industry representatives collaborating with the fuel cell research contractors. The following accomplishments are planned for FY 1983:

- Continue endurance testing and research.
- Resolve critical cell anode creep problem.
- Establish cathode with required longevity.
- Refine analytical models of electrochemical, thermal, and hydraulic cell behavior.
- Established effects of gas stream sulfur contaminants on atmospheric cell performance.

Advanced Concepts

The feasibility of solid oxide fuel cells is being verified including the resistance to impurities in the fuel and the stability of solid-state technology. Feasibility is strongly dependent on design. Reference design also includes internal reforming of fuel. In FY 1983, the following accomplishments are expected:

- Identification of improved cell materials and associated synthesis techniques initiated.
- Completion of 5,000 hour cell test.
- Initiation of tests of new seal-less cell-cluster concept.
- Redirection of the thermionic program towards coal-based fuel firing.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Phosphoric acid systems development	$17,550	$ 3,000	$-14,550

The phosphoric acid fuel cell program is developing powerplant system technology for electric utility and on-site or dispersed applications. It is a national program, cost shared with the Electric Power Research Institute (EPRI), the Gas Research Institute (GRI), manufacturers and participating utilities.

The FY 1984 funding request will provide for the continuation of Government support for an effort in the electric utility R&D area and will involve the phase-out of Government support in the on-site program. Termination costs (if any) for selected ongoing contracts will be funded using funds appropriated in FY 1983.

The specific task to be completed in FY 1984 is:

o Continue electric utility R&D subscale stack tests.

Molten carbonate systems development	$ 7,500	$ 5,000	$-2,500

The molten carbonate program is developing powerplant system technology for both electric utility and industrial cogeneration applications. It is integrated with parallel private sector programs (EPRI) and partially supported by the industrial participants and the New York State Energy Research and Development Authority.

The first molten carbonate full area short stack will be developed and tested, development of advanced integrated components will be initiated, and the ability to operate on coal derived gas will be evaluated.

Specific tasks to be completed in FY 1984 include:

o Fabricate and test first full area short MCFC stack.
o Complete 10,000 hour test of commercial type cell.
o Test cells with advanced integrated components.

Advanced concepts	$ 5,000	$ 1,500	$-3,500

The advanced concepts program in FY 1984 will be focused on solid oxide fuel cells. Research in the area of thermionics will be completed in FY 1983.

The solid oxide fuel cell program takes advantage of a design concept developed by Westinghouse which offers the potential for earlier commercialization of solid-oxide fuel cells, bypassing critical seal design problems and taking advantage of design opportunities to increase efficiency and reduce cost with internal reforming of fuel. The development proceeds from the stage of testing single nearly full-scale cells to fabrication and testing of stacks corresponding to powerplant modules.

In FY 1984, the solid oxide program will accomplish the following:

o Complete first integrated system design.
o Continue selected technology base efforts.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Fuel Cells

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Molten Carbonate Systems Dev.	Continued endurance testing and research. Continued a fundamental technology base research program. Resolved critical cell anode creep. Established cathode with required longevity. Refined analytical models of electrochemical, thermal, and hydraulic cell behavior. Established effects of gas stream sulfur contaminants on atmospheric cell performance.	Support for advanced integrated components research development will continue. Fabrication and testing of the first full area short MCFC (molten carbonate fuel cell) stack. Complete 10,000 hour test of commercial type cell.
Phosphoric Acid Fuel Cells	Continued 40 KW on-site technology development program. Continued 4.8 MWe power plant demonstration effort in New York City (including initiation). Initiation of fabrication and performance testing of Westinghouse electric utility (25 KW subscale gas-cooled stack). Completion of 2500 hour United Technologies Corporation electric utility full size cell advanced technology stack and continued testing. Continued 40 KW on-site field test project.	Development of cell stacks and verification testing will continue at a reduced level for the electric utility R&D program. No planned support for "on-site" R&D programs. 40 KW on-site field test phasing out.
Advanced Concepts	Identification of improved cell materials and associated synthesis techniques initiated. Completion of 5,000 hour cell test. Initiation of tests of new sealless cell cluster concept. Redirection of thermionics program towards coal-based fuel firing.	Complete first integrated system design in solid oxide fuel cell program. Continue low effort in technology base development No planned activities for thermionics.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Heat engines (FE)				
Central power systems:				
Operating expenses	$ 8,736	$ 3,750	$ 3,750	$ ...
Subtotal	8,736	3,750	3,750	...
Dispersed power systems:				
Operating expenses	6,240	1,250	1,250	1,000
Subtotal	6,240	1,250	1,250	1,000
Total				
Operating expenses	14,976	5,000	5,000	1,000
Capital equipment	432	...	...	...
Heat engines	$15,408	$ 5,000	$ 5,000	$ 1,000
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$ 5,000
Program increases and decreases:	
Heat Engines	
o Reduce the Government participation in the coal-fired heat engines technology base program	-4,000
FY 1984 budget request	$ 1,000

Heat engines:

Goals/Objectives:

The principal goal of this program is to establish technical data which will enable the private sector to assess the commercial viability of coal-fueled power conversion systems. The program is directed towards major technical problems associated with substituting coal or coal-derived liquid or gaseous fuels for distillate fuels or natural gas in firing gas turbine and diesel power conversion systems. The ultimate goal is to develop a technology base which would permit direct firing of a premium quality, fine particulate coal slurried with water and/or a coal-derived liquid such as methanol. This goal is applicable also to the displacement of distillate fuels and natural gas by coal-derived liquid or gaseous turbine and diesel fuels.

Specific program objectives are:

- To establish basic component cooling, component materials, combustion, and coal-slurry quality data necessary for private sector engineering and performance analyses of projected commercial coal slurry fired gas turbine power conversion systems.

- To establish basic design, combustion, materials, and fuel interactions and related engineering data to facilitate private sector assessment of the commercial viability of coal slurry fired diesel power generating systems.

FY 1983 Accomplishments:

- Continued the prior year activities in the redirected, coal-based, heat engines research and component development program.
- Completed bench scale tests of rich-lean low-NO_x gas turbine combustors.
- Evaluated coal-water slurry fuels and identified promising candidates.
- Completed first investigation of products of atmospheric pressure gas turbine combustion using coal-based solid-containing fuels.

Budget Request:	FY 1983 Appropriation	FY 1984 Request	Net Change
Heat engines	$ 5,000	$ 1,000	$ -4,000

The Heat Engines program is directed towards major engineering design, durability, and performance problems associated with the substitution of coal or coal derived fuels for distillate fuels and natural gas in firing gas turbine and diesel power conversion systems. This fuel substitution creates problems for both types of engines. In turbines, the durability of the combustion zone components (i.e., combustors, transition ducts and turbine airfoils) are of concern. Similarly, the hostile environments created by firing coal-based fuels create durability problems with diesel engine components such as cylinder walls, pistons, valves and injectors. In both applications formation of high levels of NO_x due to the fuel bound nitrogen in coal-based fuels cause environmental concern.

The coal-fired gas turbine portion of the program is focused on resolving problems associated with direct firing of coal-based fuels in a gas turbine engine. The technology base to be built begins with laboratory investigations to determine the products of combustion that will traverse the power turbine section when coal-based, solids-containing fuels are used. This will be followed by tests of slurried fuels in research gas turbine devices.

The coal-fired diesel engine portion of the program involves developing a new technological base for the use of a coal-based fuel directly in a diesel engine. Beneficiated coal-water slurries are the fuels being investigated. The program will involve the laboratory investigation of the combustion, corrosion and wear properties of slurries in the temperature/pressure profiles of a diesel engine, the characterization of various slurries (types of coals and degree of beneficiation), and tests in research engines.

Specific tasks to be completed in FY 1984 include:

- The technology base efforts initiated in the FY 1982-1983 period will be completed.
- All data and results obtained will be collected and a status report summarizing available data will be prepared and distributed to interested Federal agencies and private sector concerns.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Heat Engines

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Heat Engines	Continued the prior year activities in the redirected, coal-based, heat engines research and component development.	Work initiated in FY 1982-FY 1983 will be completed.
	Completed bench scale tests of rich-lean low NO_x gas turbine combustors	Preparation of a status report summarizing available data and distribution to interested parties.
	Completed first investigation of products of atmospheric pressure gas turbine combustion using coal-based solid containing fuels.	
	Evaluated coal-water slurry fuels and identified promising candidates	

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Underground coal gasification (FE)				
Gasification technology development:				
Operating expenses	$ 5,952	$ 5,300	$ 5,300	$ ...
Subtotal	5,952	5,300	5,300	...
Environmental and advanced research:				
Operating expenses	2,016	700	700	2,000
Subtotal	2,016	700	700	2,000
Total				
Operating expenses	7,968	6,000	6,000	2,000
Capital equipment	288	...	...	...
Underground coal gasification	$ 8,256	$ 6,000	$ 6,000	$ 2,000
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$ 6,000
Program increases and decreases:	
Gasification Technology Development	
o Terminate technology development work	-5,300
Environmental and Advanced Research	
o Complete cost-shared proof of concept test of CRIP concept	+1,300
FY 1984 budget request	$ 2,000

Underground coal gasification:

Goals/Objectives:

Underground coal gasification (UCG) is an unconventional method to produce fuels by gasifying seams of coal "in situ" without mining. Underground coal gasification includes several related processes for converting solid coal underground to more easily recovered gaseous products that can either be directly utilized or converted to a suite of hydrocarbon products. Successful adoption of these processes could quadruple U.S. coal reserves while providing fuels at potentially lower costs and with less adverse environmental impacts than other synthetic fuels options. The expected final products from this technology could be transportation fuels (primarily methanol and gasoline), electric power, industrial heating, synthetic natural gas, chemical feedstocks, and in site specific cases, a generator of CO$_2$ for enhanced oil recovery and hydrogen for refinery use or shale oil upgrading. A successfully completed technology base development test in steeply dipping coal beds has stimulated industry interest in this version of UCG such that high levels of industrial cost sharing have been proposed (50% or more) for a proof of concept test.

The major objectives of this program are the following:

- Accelerate the development of environmentally acceptable in situ technologies for converting currently unmineable coal into liquid or gaseous fuels.
- Demonstrate the viability of producing medium-Btu gas from steam/oxygen underground coal gasification to provide a suitable feedstock for surface upgrading.
- Increase the data base for transfer to private industry for the development of economically viable in situ conversion processes and prepare the data base in convenient form for use by industry and other researchers.
- Work actively with industry to insure maximum technology transfer.

FY 1983 Accomplishments:

The anticipated FY 1983 accomplishments include:

- Perform required environmental research and monitoring for all past field test sites.
- Complete post-burn coring and evaluation of all post-burn sites for incorporation into the UCG data base.
- Complete 30 day government/industry cost-sharing field test of a novel concept (CRIP) for UCG in thick, high ash Washington State coal using FY 1982 funds.
- Monitor three university contracts to define basic process parameters.
- Explore the feasibility of UCG in Eastern bituminous coals at a specific site as a logical follow on to a recently completed general feasibility study that was requested by Congress.
- Pursue low-level process modeling and technology-transfer activities.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Gasification technology development	$ 5,300	$ ...	$ -5,300

The Gasification Technology Development subactivity includes all those activities relating to field gasification testing for development of basic input data for process designs. Over a dozen field tests have been completed in the program producing a fairly complete data base which should allow design of the next logical step -- a proof-of-concept test. Industrial groups are now considering conducting such a test drawing on the DOE developed data. The ongoing field program in Washington State will be completed with FY 1983 and industry cost sharing funds with post-burn evaluation and monitoring activities funded in FY 1984 under the Environmental and Advanced Research Subactivity.

Environmental and advanced research	$ 700	$ 2,000	$ +1,300

The environmental and advanced research subactivity addresses relevant environmental and technology base efforts necessary for the long-term development of Underground Coal Gasification. The environmental efforts in FY 1983 are designed to ensure that necessary post-burn environmental monitoring of past gasification sites and relevant environmental mitigation research are accomplished to comply with existing contracts with state departments of environmental quality in Wyoming, West Virginia, and Washington. These efforts will require $700,000 in FY 1983 and FY 1984. In addition, the request for $1,300,000 for advanced research will be for further evaluation of a highly-promising novel UCG concept, the Controlled Retracting Injection Point (CRIP), through cooperative agreements with the Gas Research Institute (GRI), the State of Washington, and the Washington Irrigation and Development Company (WIDCo). This concept promises to obviate some major technical issues impeding further UCG development, such as establishment of reliable flow paths between process wells, reliance on overburden competence, production of uniform quality gas over time, and dependence on coal rank.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Underground Coal Gasification

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Gasification Technology Development	Complete ongoing field test programs.	No planned field test technology development programs.
Environmental and Advanced Research	Complete 30 day government/industry cost-sharing field test on Controlled Retracting Injection Point (CRIP) concept.	Perform post-burn coring and analysis of CRIP and incorporate into UCG data base.
	Perform post-burn environmental monitoring on all tests, including CRIP.	Continue post-burn environmental monitoring.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Magnetohydrodynamics (FE)				
Open-cycle plasma systems:				
Component development & integration facility				
Operating expenses	$ 7,200	$ 7,600	$ 7,600	$ ...
Engineering development				
Operating expenses	15,070	17,300	17,300	...
Systems engineering				
Operating expenses	500	600	600	...
Supporting research				
Operating expenses	4,870	3,400	3,400	...
Subtotal	27,640	28,900	28,900	...
Closed-cycle systems:				
Operating expenses	200	100	100	...
Subtotal	200	100	100	...
Total				
Operating expenses	27,840	29,000	29,000	...
Capital equipment	...	...	...	...
Effect of FY 1981 deferral	-6,000	...	...	...
Magnetohydrodynamics	$21,840	$29,000 1/	$29,000 1/	$ ...
Staffing				
FTP/Total FTEs				

1/ Includes program termination costs estimated to be $12,000,000.

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$29,000
Program increases and decreases:	
Magnetohydrodynamics	
o Phase-out the MHD program to include the CDIF and CFFF facilities and bring other ongoing efforts to an orderly conclusion	-29,000
FY 1984 Budget request	$ ...

Magnetohydrodynamics:

Goals/Objectives:

MHD is a long term technology which, relative to other Agency funded advanced electricity generating technologies under development, has much higher development risks and costs. Moreover, the other alternative electricity technologies may be ready for commercial introduction much earlier than MHD. Because of these factors, the Federal MHD program is being proposed for termination with phase out of the overall MHD program beginning in FY 1983. The various government test facilities will be either mothballed or made available to industry groups who may be interested in pursuing further development.

Accomplishments:

Major programmatic accomplishments for MHD in FY 1983 are:

- Continue CDIF/CFFF test facility operations through mid-FY 1983.
  - Continue IAI generator characterization tests (CDIF).
  - Continue NO_x/SO_x emission control characterization tests (CFFF).
  - Continue DC/AC inverter characterization tests (CDIF).
- Initiate phaseout CDIF/CFFF facilities in mid-FY 1983.
- Bring the component development activities to an orderly conclusion in FY 1983, complete final reports, and attain the following milestones:
  - Complete design of a 50 MWt scale MHD coal combustor.
  - Continue long duration channel tests.
  - Experimentally confirm analytical models and verify scaling laws governing MHD channel performance by demonstrating a minimum of 12% channel enthalpy extraction at a magnetic field of 4 Tesla.
  - Continue instrumentation R&D and verify performance of specific diagnostic instruments in MSU/CFFF tests.
  - Continue Advanced Power Train program.
- Contract with a reputable energy oriented institution to conduct an evaluation of the MHD program.

Budget Request:	FY 1983 Appropriation	FY 1984 Request	Net Change
Magnetohydrodynamics	$29,000	$ ...	$-29,000

In conjunction with the refocusing of the Coal R&D program, no funds have been requested in FY 1984 for continuing the development and demonstration of MHD. Continuation of the past program would have resulted in a costly effort which would have included $250,000,000 for technology base development and at least $300,000,000 for a multimegawatt proof-of-concept facility. In order to facilitate the phase out of Departmental efforts, the MHD program will be redirected in FY 1983 to closeout facilities and bring other ongoing efforts to an orderly conclusion.

Consistent with the Administration's policy, continued responsibility for development and demonstration of MHD will become the responsibility of private industry. The government test facilities will be mothballed or made available to industry groups who may be interested in pursuing MHD development.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Magnetohydrodynamics

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Magnetohydrodynamics	Continue CDIF/CFFF test facility operations through mid-FY 1983. Initiate phase-out of CDIF/CFFF facilities in mid-FY 1983. Bring the component development activities to an orderly conclusion and complete final reports. Contract with a reputable energy oriented institution to conduct an evaluation of the MHD program.	No planned MHD activities for FY 1984.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Mining research and development (FE)				
Underground coal mining:				
Operating expenses	$10,512	$ ...	$ ...	$ ..
Subtotal	10,512	...	...	...
Total				
Operating expenses	10,512	...	...	...
Capital equipment	430	...	...	...
Mining research and development .	$10,992	$ ...	$ ...	$ ...
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Mining research and development:

Public Law 97-257 transferred the coal mining research and development program to the Bureau of Mines in the Department of the Interior; therefore, no funds are requested in the FY 1984 Fossil Energy R&D budget for Mining R&D.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Surface coal gasification (FE)				
Advanced process development:				
Operating expenses	$ 5,520	$ 4,250	$ 4,250	$ 4,000
Subtotal	5,520	4,250	4,250	4,000
Systems engineering concepts:				
Gasifier systems Operating expenses	28,248	21,250	21,250	3,900
Equipment/instrumentation concepts Operating expenses	10,344	6,000	6,000	3,000
Subtotal	38,592	27,250	27,250	6,900
Environmental and engineering analyses:				
Environmental studies Operating expenses	3,888	3,250	3,250	3,000
Engineering analyses/support Operating expenses	5,640	4,250	4,250	...
Subtotal	9,528	7,500	7,500	3,000
Great plains coal gasification project:				
Operating expenses	...	...	...	3,000
Subtotal	...	...	...	3,000
Total				
Operating expenses	53,640	39,000	39,000	16,900
Capital equipment	528	...	...	...
Surface coal gasification	$54,168	$39,000	$39,000	$16,900
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$39,000
Program increases and decreases:	
Advanced Process Development	
o Reduces the number of new projects initiated on imaginative concepts for improving gas cleanup	-250
Systems Engineering Concepts	
o Gasifier systems - Requires redirection of fluidized-bed agglomeration gasification technology program to complete all studies by end of FY 1983 and modification of gasifier operational support program that provides characteristic effluents and test conditions for environmental, materials and components projects	-17,350
o Equipment/instrumentation concepts - program redirection to permit continuing only high priority ongoing projects with near-term deliverables	-3,000
Subtotal	$-20,350

Environmental and Engineering Analyses	
o Environmental studies - reduction in the number of process stream characterization studies	-250
o Engineering analyses - Eliminates various projects involving program planning, data collection and dissemination	-4,250
Subtotal	$ -4,500
Great Plains Project	
o Continue implementation of the monitoring agreement that confirms progress of construction, financial status, environmental/socio-economic status, cost and schedule	+3,000
FY 1984 budget request	$ 16,900

Surface coal gasification:

Goals/Objectives:

The Surface Coal Gasification Program's overall goal is to assist industry to advance the state-of-the-art of coal gasification through the parallel development of new concepts, the refinement of existing systems and the generation of an adequate technology data base for the private sector to conduct normal risk assessments upon which to base commercialization decisions. This objective is being achieved through the development of advanced gasifiers and gasification processes that have the capability to process all U.S. coals irrespective of the widely differing physical properties and chemical compositions that characterize these heterogeneous feedstocks. These studies are directed specifically at those early stages of process development when the risks are very high and the potential return is as yet uncertain. These efforts include the investigation of processing fundamentals as well as new and promising gasifier and gasification process concepts. In developing these advanced environmentally acceptable processes, the full potential of coal gasification as a means for converting the extensive coal resources into clean alternate fuels can be realized. Through gasification, coal can be used for the economic manufacture of fuel gases having heating values that range from low/medium-Btu fuel gas for industrial and electric utility uses to high-Btu gas of pipeline quality that can be used to supplement supplies of natural gas. Gasification technology also can be used to produce a synthesis gas suitable for subsequent conversion into a variety of liquid fuels or for use as a feedstock for the manufacture of chemicals.

To accomplish its goal, the following specific objectives have been established for the Surface Coal Gasification Program:

- Explore and determine the applicability of alternate chemical processing principles as well as fluid dynamics as ways to potentially improve the overall efficiency and economics of gasification processes.
- Develop new and promising process concepts through the proof-of-concept stage for medium-Btu gas production which allows processing of all U.S. coals with high overall efficiencies (at least 5 percent improvement) and lower potential product cost (at least 20 percent improvement) as compared to first generation Lurgi-based systems.
- Explore and develop new and/or improved components, including both process and diagnostic research instrumentation which will allow improved process control, reduced process costs, and a better understanding of problem areas.
- Establish a data base on environmental, worker health and safety performance of commercial and pilot gasification systems and, based upon the results develop effluent treatment system concepts capable of meeting existing emission limits as authorized in air, water and solids disposal regulations as well as workplace safety and health requirements.

The Federal research role will be to support activities in areas where there is high technical risk and where the problems are generic to many gasification processes. Successful Federal efforts to reduce technical risk to a reasonable degree and to develop a well founded data base will create the appropriate incentives for subsequent scale-up and commercialization by industry.

An additional objective is to assist industry in the establishment of a commercial project to convert coal into a substitute for natural gas. Five gas pipeline companies, the American Natural Resource, MidCon Corp., Tenneco, Inc., Transco, Inc., and Pacific Synthetic Fuel Corporation, formed a partnership to process North Dakota lignite into a clean burning gas with heating equivalent of more than 7.2 million barrels of oil per year. The firms are constructing a coal gasification plant in Mercer County, North Dakota. The gas will be marketed through an interstate network of gas pipelines. The Department of Energy is assisting this project through the guarantee of a fixed maturity secured loan in an amount not to exceed $2.02 billion which was signed on January 29, 1982. A Monitoring Agreement was signed that specifies specific reporting requirements to the Department that will present progress of construction, financial status, environmental/socioeconomic status, cost, and schedule.

FY 1983 Accomplishments:

o Completed evaluation of a number of valves particularly suited for dirty gas service.
o Completed construction of the advanced gasification concepts experimental system.
o Evaluated gasification process modeling techniques and incorporated new advances into the capabilities of the data base management system.
o Initiated studies on establishing the relationships between coal ash components and the subsequent behavior of the ash (i.e., viscosity, erosive characteristics) when subjected to the operational conditions of advanced gasifiers.
o Continued a comprehensive environmental and health safety program which includes an integrated approach to the problems of process optimization as a means of effluent control and waste water management in coal gasification facilities.
o Completed work to determine the operational characteristics of a coal gasification system (i.e., from coal preparation through gas cleanup) under transient (i.e., varying demand) conditions.
o Continued the study of advanced techniques, unit operations, equipment and operational variables that can be used to optimize a gasification clean-up system by performing coordinated tests on effluents generated from fixed-bed gasification systems at the Energy Technology Centers.
o Initiated a study of the unique effluent problems as well as the gasification characteristics (i.e., ash components problems, slagging behavior, reactivities, etc.) of low rank coals representative of the large resources of such coal.
o Established an experimental program to test the viability of the high-rate entrained-bed slagging gasifier and develop essential scaling criteria.
o Established the feasibility of a new integral hot dirty gas heat exchanger.
o Continued an operational test program with a single stage crystallizer to verify technical and performance objectives of a new (CNG) acid gas removal process.
o Redirected the environmental and safety program to solve problems limiting acceptability of key cleanup systems projected for use in commercial facilities. Studies also initiated to explore novel approaches to disposal problems created by the "zero discharge" rule.
o Initiated a design study to determine suitability of the BI-Gas pilot plant for conversion to a multi-purpose test facility.
o Continued studies to optimize gasifier operational parameters and configurations to vary the offgas composition and gasifier performance characteristics. Coordination efforts established to match the results of this work with requirements of indirect liquefaction reactors.
o Continued DOE loan guarantee monitoring of the Great Plains Gasification project.
o Advanced the state-of-the-art of fluidized-bed pressurized gasification technology through study of key mechanisms controlling such phenomena as clinkering, agglomeration, fines generation, etc., during operation of test PDU reactor in conjunction with full size cold flow test facility.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Advanced process development	$ 4,250	$ 4,000	$ -250

The major objective of the activities being conducted under the Advanced Process Development budget category is the establishment of a comprehensive technology data base for new gasifier concepts and gasification systems integration. Process fundamentals, new waste water treatment techniques, computer modeling of gasification reactors and the collection of basic data related to all phases of the coal gasification total system, including low temperature gas cleanup and effluent disposal, are examples of this effort. Basic programs involving kinetic and fluid dynamics, thermochemistry and other fundamental concepts including sophisticated process chemistries are all part of these higher risk, long range research projects which have the potential for high payoff upon successful completion.

During FY 1983, several important accomplishments occurred. A small scale pressurized (up to 1000 psig) fluidized bed reactor system was operated at the Advanced Gasification Test Facility at the Morgantown Energy Technology Center (METC) and is now being used for fundamental studies. A number of modeling projects were completed and the computerized models are being used to confirm the fluidized bed data base and to evaluate the experimental data generated in the Mountain Fuel entrained bed project. If these studies demonstrate that the experimental and actual operational data agree, the scale-up of the specific technology will be simplified. Bench scale tests which investigated such concepts as biogasification, and aqueous phase methanation were completed. Construction of a small entrained-bed type gasification reactor system was also completed. This system is also at the Advanced Gasification Test Facility at METC, and is now being used in fundamental studies of this type of gasifier. Fluidization cold flow test equipment was fabricated to explore the mechanisms occurring in fluidized beds. In addition, an investigation of the parameters that control the successful briquetting of coal fines for use in gasifiers which normally cannot use coal fines as a feedstock were initiated and the initial results appear promising.

In FY 1984, tests will be conducted in the small entrained bed and fluidized bed reactor systems. These tests will be aimed at establishing baseline conditions and understanding mechanisms that occur in the fluidized-bed and entrained-bed reactors. Also, efforts to understand carbonization-type reactors on a variety of coals over a broad range of temperatures and pressures will be continued. As part of these studies, the parameters that must be controlled to successfully operate fluidized bed reactors will be examined. Key mechanisms that control agglomeration, sintering, clinkering, etc., in fluidized bed systems will be studied. In addition, the state-of-the-art of fluidized bed reactors will be advanced by continuing work at METC on the high pressure cold flow model with emphasis on elucidation of the effects of pressure on jet penetration in a fluid bed. Also, the effect of inlet velocity and nozzle design will be studied by measuring and observing bed spouting phenomena and bubble formation, i.e., size, frequency and velocity. Modeling from the systems engineering view point will be continued as well as process modeling to support ongoing research programs.

Studies will also continue in determining the inter-relationships between coal composition, subsequent ash chemistry, flux addition and resulting slag viscosities. These are key parameters that must be known to fully utilize the capabilities of the slagging fixed-bed gasifier or the more advanced entrained bed systems. Basic experiments will be conducted on gasification systems waste water treatment processes as well as process optimization as ways to reduce to a minimum any environmental impact that may be associated with coal gasification processes. Particular attention will be directed towards determining how these factors vary when a low rank coal is used as the feedstock. These data are needed in the design of any coal conversion facility that plans on utilizing the potential of the large deposits of low rank coal that are available.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Systems engineering concepts	$27,250	$ 6,900	$-20,350

In general, the work within the category of Systems Engineering Concepts is directed towards the continued development of gasification systems, optimization of existing concepts and a fuller understanding of the operational interdependency of the various processing units of a coal gasification process to permit successful integration into a operational system. These efforts have been divided into two major areas. The first technology area is the gasifier itself and its associated upstream and downstream processing units. The second area encompasses the engineering development effort required to increase gasification facility efficiency, operational reliability and control as well as the subsequent economics through the development of critical operational components, suitable application of materials technologies and the use of advanced instrumentation and control techniques.

Gasifier systems	$21,250	$ 3,900	$-17,350

In FY 1983, all but one of the major PDU and pilot plant projects was completed. As part of this effort, the technology data base for the Bi-Gas concept of converting coal into a substitute natural gas was established and the technology upon which the agglomerating fluidized-bed gasifier concept was based was transferred to industry. As a result of these gasifier development efforts, a number of options have been developed that can be used by industry to convert all types of coal into alternate forms of gas and liquid fuels as well as chemical feedstocks.

In FY 1984, program emphasis will be redirected from gasifier concepts to gasification systems. Gasification system development projects to be supported will have the potential to minimize problems associated with unit integration, and system optimization; can significantly increase the overall processing efficiencies of these systems; and ultimately improve, in a major way, the economics and environmental acceptability of their performance. The greater part of these data can be generated only through studies performed during actual operating conditions with characteristic processing streams and through the use of actual effluents from gasifiers and gasification systems.

Specifically, a fixed-bed gasifier will be operated to generate characteristic effluents needed for the development of advanced cleanup components and systems. Particular attention will be directed to resolving operational problems known to exist with sulfur removal systems operating on gas streams containing small amounts of these sulfur compounds. In addition, the special problems introduced by the zero effluent discharge requirement for gasification facilities will be investigated through the analyses and treatment of these characteristic effluents. As part of this effort, the PDU facility will be utilized to complete the development of the Mountain Fuels advanced, entrained-bed, down-flow, slagging gasifier and concurrently to complete the evaluation of a novel dirty gas heat exchanger concept that is used as an integral part of the gasifier.

The data generated in these experimental/operational efforts are essential to the development of a balanced technology data base. This data base is the essential resource for any future transfer of the technology to industry and is the basis upon which the commercialization of the technology will take place. Effective data base management requires an adequate and updated resource of information which can come only through the continued access and verification of key concepts. The generation of such data is the objective of the gasifier systems effort.

Equipment/instrumentation concepts	$ 6,000	$ 3,000	$ -3,000

The successful operation of a coal gasification facility at an acceptable level of reliability, economy, efficiency and control, is highly dependent upon the availability of suitable equipment, instrumentation and control systems, materials of construction and techniques for material fabrication. This is also true to a lesser degree, for the development of gasification processes in process development units (PDU) and pilot plants. However, these latter plants have additional instrumentation needs for process and process stream characterization and monitoring. Previous gasification PDU and pilot plant operations have shown that equipment and technology from other industrial processes are inadequate or only minimally suitable in many areas for coal gasification application. This is primarily attributed to the unique combination of high temperatures, high pressures, solids laden erosive and corrosive environments present in the processes and process streams in which equipment and instrumentation must function.

As is the case in other technology areas, the development work accomplished under this program utilizes and applies fundamental data derived from the similar, but more basic effort that is underway as part of the Advanced Research and Technology Development work. These engineering development activities directly address special problems that limit operational reliability, increase costs of facility construction and impact adversely on the efficiencies of coal gasifiers and gasification processes.

During FY 1983, a program implementing an integrated approach to the development of coal gasification components, instrumentation, and materials application was continued. In most instances, the project tasks have taken or include successful AR&TD exploratory and advanced development projects as the foundation of the engineering development effort. Successful completion of this program will culminate with technology being available for implementation by industry in the design, construction and operation of coal gasification plants. In the area of components, pilot scale coal feeder development projects were concluded with proof-of-concept and limited durability tests. Studies were initiated on several promising techniques for the measurement of high temperatures existing inside heavy walled reactors, the quantitative determination of the components in two-phase streams (gas, solid) and the determination of pressure differentials at various levels within a reactor system.

During FY 1984, engineering development will continue on priority long range development projects. Efforts will be initiated to identify specific design developments needed for gasification hot dirty gas exchangers, compressors, expanders and valves, and for new concepts considered as a high risk, but with the potential to significantly improve the performance characteristics of gasifier systems.

In the area of instrumentation, evaluations of particulate monitoring systems will be continued. Testing of an on-line heavy metal detector will be initiated as part of a joint effort with the Control Technology program. Methods for analysis of high temperature process streams will be further developed and evaluated. Development, testing and field evaluation of acoustic instruments for measuring erosive wear of metal and refractory liners of gasification vessels, and piping will continue. Development and testing of mixed phase, solids/gas flowmeters, temperature indicators, slurry flow and solid element analysis instrumentation will continue in laboratory test loops.

Materials development and application studies will include continuation of coupon exposure tests under actual gasifier conditions. The effects of slag additives on gasifier refractory life will be assessed in specially designed laboratory equipment. Studies on metal coatings and claddings, which are highly resistent to corrosion and erosion, will be continued.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Environmental and engineering analyses	$ 7,500	$ 3,000	$ -4,500

This category provides the technical and environmental assessment information and engineering evaluation data necessary for program definition and prioritization to ensure that the Surface Coal Gasification program is responsive to the Administration's objectives in this area of coal processing.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Environmental studies	$ 3,250	$ 3,000	$ -250

Emphasis on understanding the environmental aspects of surface coal gasification was increased in FY 1983. A complete integrated environmental research program plan was developed in coordination with DOE-ER. Cooperative programs were continued with EPRI and GRI to obtain effluents data on the Bi-Gas and Westinghouse processes, respectively. Effluents characterization was continued at the METC gasifier with its advanced gas cleanup system, and with Argonne National Laboratory at the GFETC slagging gasifier. An initial environmental test plan was developed for the Mountain Fuel reactor. Support was provided for operation of the GE gasifier to provide a selected set of stream effluent data and to evaluate the impact of selected process modifications on reduction of effluents. All collected environmental data was evaluated for inclusion in the METC Gasification Technology Data Base (GTDB) and selected data was entered into the GTDB. Promising novel concepts for gasification wastewater treatment were tested at the Universities of Illinois and California. Development began on computer simulation models for selected gasification environmental controls for comparative evaluation of promising techniques and to evaluate "zero discharge" water management schemes.

In FY 1984, emphasis will again be placed on environmental aspects of the technical support program. Effluents data collection efforts will be substantially completed for the Mountain Fuels and fixed-bed gasifiers. All available data will be entered into the METC gasification data base. Testing of two novel wastewater treatment concepts will be completed, and an evaluation made of their efficiency and cost effectiveness through computer simulations. A study of novel process modification concepts to reduce pollutant loadings and treatment costs will be initiated. The purpose of the project will be to improve the capability to clean gasification processing streams as well as to find ways to reduce the overall plant efficiency penalty associated with the operation of a cleanup system. The essential environmental control systems needed to make the gasifier and associated end use systems responsive to each other will be evaluated and key parameters necessary for the effective design of such systems will be determined.

Engineering analyses/support	$ 4,250	$ ...	$ -4,250

During FY 1983, several sections of the gasification program as well as individual projects were evaluated to assess comparative advantages and disadvantages, determine deficiencies, provide the data required to resolve some problems and to serve as a basis for redirection of work on some projects. As a concurrent effort, the gasification technology base was evaluated as required to develop and implement an effective system to assess, evaluate, cross-cut extropolate, apply, etc., data that have been generated in the numerous gasification programs supported by the government, industrial sector or international community. The results of this work are being used to guide the program efforts and to ensure that the transfer of this technology to industry will occur in an effective manner.

In FY 1984 these support studies and analyses will be funded by those projects they directly support.

Great plains coal gasification project	$ ...	$ 3,000	$ +3,000

The objective is the management of the loan guarantee and the monitoring of the project by DOE headquarters and field elements. The requested funds will support activities related to project monitoring by Chicago Operations Office assisted by the Grand Forks and Morgantown ETC's. Overall program management, administration, and monitoring will occur at the headquarters level. No funds were requested in FY 1983 because prior year funds were available from the Alternate Fuels Production Appropriation for these activities.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Surface Coal Gasification

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Advanced Process Development	Operate a small scale pressurized (up to 1000 psig) fluidized bed reactor system. Utilize data from modeling projects to confirm the fluidized bed data base and evaluate the Mountain Fuel entrained-bed project. Investigate biogasification and aqueous phase methanation bench scale tests. Complete construction of a small entrained-bed type reactor system.	Continue tests in the small entrained bed and fluidized bed reactor systems. Continue work to understand carbonization-type reactors on a variety of coals over a broad range of temperatures and pressures. Continue work on high pressure cold flow models with emphasis on elucidation of the effects of pressure on jet penetration in a fluid bed. Study the effect of inlet velocity and nozzle design by measuring and observing bed spouting phenomena and bubble formation. Conduct experiments on gasification system waste water treatment processes.
Systems Engineering Concepts	Complete all but one of the major PDU and pilot plant projects. This includes establishing the technology data base for the Bigas concept of converting coal into a substitute natural gas as well as transferring to industry, the agglomerating fluidized-bed gasifier technology. Continue to develop coal gasification components, instrumentation, and materials application. Conclude pilot scale coal feeder development studies and conduct limited durability tests. Initiate studies on techniques to measure high temperatures existing inside heavy walled reactors. Continue to operate fluidized-bed reactor in conjunction with cold flow system to generate data essential to understanding key parameters needed to design and operate these gasifiers. Continue to operate fixed-bed gasifier in support of environmental and components projects.	Redirect program from gasifier concepts to gasification systems. Operate a fixed-bed gasifier to generate characteristic effluents needed for the development of advanced cleanup components and systems. Complete evaluation of a novel dirty gas heat exchanger concept. Complete the development of the Mountain Fuels advanced entrained-bed, down-flow slagging gasifier and investigate special problems introduced by the zero effluent discharge requirement for gasification facilities. Initiate efforts to identify specific design developments needed for gasification hot dirty gas exchangers, compressors, expanders and valves. Continue evaluation of instrumentation particulate monitoring systems.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Surface Coal Gasification

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Systems Engineering Concepts (continued)		Continue evaluation of methods of analyzing high temperature process streams Continue materials development and applications studies.
Environmental and Engineering Analysis	Develop an integrated environmental research program plan in coordination with DOE and ER. Continue cooperative programs with EPRI and GRI to obtain effluents data on the Bigas and Westinghouse processes, respectively. Evaluate environmental data for inclusion in the METC Gasification Data Base. Evaluate data to develop and implement an effective system to assess, evaluate and apply data from numerous government and private industry sources.	Effluents data collection efforts will be substantially completed for the Mountain Fuels and fixed-bed gasifiers. Initiate a study of novel process modification concepts to reduce pollutant loadings and treatment costs. Engineering analyses/support work will be incorporated as part of other ongoing gasification projects.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Coal
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Program Direction (FE)				
Headquarters:				
Operating expenses	$11,804	$ 8,200	$ 8,200	$ 7,060
Subtotal	11,804	8,200	8,200	7,060
Energy technology centers:				
Operating expenses	...	23,700	23,700	...
Subtotal	...	23,700	23,700	...
Total				
Operating expenses	11,804	31,900	31,900	7,060
Program Direction	$11,804	$31,900	$31,900	$ 7,060

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$31,900
Program increases and decreases:	
o This amount will be revised to be consistent with direction provided with the FY 1983 Appropriations Act as soon as final definitions and allocations for direct and indirect ETC operating expenses have been established for FY 1984	-23,700
o Eliminate funds for severance and lump sum payments in transition from FY 1982 to FY 1983	-1,140
FY 1984 budget request	$ 7,060

The FY 1984 request of $7,060,000 for Program Direction for the Coal Program will provide funds for salaries, benefits and travel for 119.4 FTE's at Headquarters. The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

The Headquarters staff is responsible for overall program direction. In carrying out this responsibility, the Headquarters staff: implements DOE policy and communicates that policy to the Energy Technology Centers; sets program objectives; develops program plans and evaluates alternative program strategies; develops and defends budget requests to the Office of Management and Budget and to the Congress; approves procurement plans; and monitors work progress, evaluates projects, and approves revisions in work plans as required to attain program goals.

The proper coordination and direction of the coal program requires close and active participation by Department management in contract selection and administration and requires frequent reviews by Headquarters staff with program responsibility. The complexity of the program, the geographic distribution of the research efforts throughout the United States, and the intensive and frequent reviews necessary to manage these efforts requires constant coordination with performing organizations.

The FY 1984 request does not currently reflect the reallocation of funding between program activities and the ETC Program Direction account necessary to conform with guidance provided with the FY 1983 Appropriations Act. The corrected amounts will be provided to Congress in the near future when final definitions for direct and indirect ETC operating expenses have been established and revised estimates developed for FY 1984.

In addition, 417.6 FTE's are requested for the Energy Technology Centers (ETC's) to execute the day-to-day project management functions for assigned programmatic areas. ETC's personnel perform in-house R&D functions and manage industrial and university contracts and National Laboratory R&D efforts. Typical work activities performed include contract and National Laboratory monitoring, performance of technical evaluations, development of project and procurement plans, dissemination of technical data, and other activities related to program and site support.

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

Fossil Energy Activities - Plant and Capital Equipment
Advanced Research and Technology Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Surface water containment & waste water treatment facility, Pittsburgh Energy Technology Center Bruceton, PA

2. Project No. 82-F-506

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3. Date A-E work initiated: 4th Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 3rd Qtr. FY 1984

5. Previous cost estimate: $3,000
Date: 12/81

6. Current cost estimate: $3,000
Less amount for PE&D: None
Net cost estimate: $3,000
Date: 12/82

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7. Financial schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1982	1,000	960	426	0
1983	1,000	1,000	1,534	840
1984	1,000	1,040	1,040	705
1985	0	0	0	1,455

8. Brief physical description of project:

This project provides for the construction, initial equipping and operation of a surface water containment and waste water treatment facility at PETC. The facility will be constructed on land that is owned and maintained by the U.S. Government.

Initially, this waste water facility was to treat the waste water from the entire Bruceton research center. Subsequent events have reduced the treatment scope. The proposed facility will now receive and treat only waste water from the DOE PETC laboratory. This has necessitated a site change to a less desirable location and to a higher elevation. The additional site preparation, pumping, and piping required by the changed site has caused the overall cost of the facility to remain at approximately the original estimate of $3,000,000.

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Surface water containment & waste water treatment facility, Bruceton, PA   2. Project No. 82-F-506

8. **Brief physical description of project:** (cont'd)

The roof will be designed to accommodate solar heating and cooling collectors. The design will be in accordance with Appendix 6301, ERDA (AEC) Design Criteria and Draft Supplement including Energy Conservation Criteria. Building insulation will be established by detailed cost benefit analysis as established by energy conservation and solar heating and cooling criteria. The entire facility will be designed to insure maximum energy conservation and to comply with all environmental, health and safety regulations.

9. **Purpose, justification of need for, and scope of project:**

This facility will provide for at least secondary treatment of all waste water prior to discharge into Lick Run which will fulfill legal requirements mandating that a primary containment facility be used prior to the discharge of waste into the waters of the United States. This facility is needed to achieve compliance with the Federal Water Pollution Control Act, Sections 301, 311, 313, and 402, which also mandates installation of the best available control technology not later than July 1, 1984.

10. **Details of cost estimate:**

	Item Costs	Total Costs
a. Engineering, design and inspection at 14% of construction costs, item b		$ 290
b. Construction costs		2,150
(1) Improvements to land, including grading, drainage diversion, asphalt paving, security fencing and area lighting	$ 50	
(2) Buildings and constrainment structures	1,000	
(3) Special facilities including waste water treatment equipment, hydrogen detectors, ventilation, oil/water separation, solid liquid waste, monitoring, and other systems	600	
(4) Utilities, including primary and secondary feeders, other utilities and tie-ins	300	
(5) Support equipment and work benches	200	
Subtotal		2,440
c. Contingency at approximately 23% of above costs		560
Total project cost		$3,000

1. Title and location of project: Surface water containment & waste water treatment facility, Bruceton, PA
2. Project No. 82-F-506

11. **Method of performance:**

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed price contracts awarded on the basis of competitive bids.

12. **Funding schedule of project funding and other related funding requirements:**

a. Total project funding	FY 1982	FY 1983	FY 1984	FY 1985	Total
(1) Total facility costs, construction	$ 0	$ 840	$ 705	$1,455	$3,000
(2) Other project funding	0	0	0	0	0
Total project funding	$ 0	$ 840	$ 705	$1,455	$3,000

b. Total related annual funding requirements (estimated life of project: 20 years)

(1) Facility operating cost	$160
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but to program effort in the facility	10
(4) GPP or other construction related to program effort in the facility	0
(5) Other costs	0
Total other annual funding requirements	$170

13. **Narrative explanation of total project funding and other related funding requirements:**

a. Total project funding
   (1) Total facility costs
   No narrative required.

   (2) Other project funding
   No narrative required.

b. Total related funding requirements
   (1) Facility operating costs
   Includes janitorial services, utilities, and routine maintenance. It should be noted that after the first five years of operation, $10,000 per year may be required in GPP funds.

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Surface water containment & waste water treatment facility, Bruceton, PA

2. Project No. 82-F-506

14. Incorporation of fallout shelters:

Items to be constructed as part of this project are not suitable for use as fallout shelter.

15. Pollution prevention; abatement and control:

The total cost of the project where applicable include costs of those measures necessary to assure compliance with Executive Order 11752.

16. Evaluation of flood hazards:

Items to be constructed as part of this project will be located in an area not subject to flooding determined in accordance with Executive Order 11988.

17. Environmental impact:

Items to be constructed as part of this project will be in compliance with the National Environmental Policy Act and other applicable related statutes and will not be located in a floodplain/wetland.

18. Accessibility for the handicapped:

Items to be constructed as part of this project will be accessible to the handicapped in accordance with the Architectural Barriers Act, P.L. 90-840, and implementing instructions in the Federal Property Management Regulations (41 CFR 101-91.6).

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

Fossil Energy Activities - Plant and Capital Equipment
Advanced Research and Technology Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects for Energy Technology Centers

2. Project No. 84-FE-101

3. Date A-E work initiated: various

3a. Date physical construction starts: FY 1984

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: $ None
Date:

6. Current cost estimate: $ 2,000
Less amount for PE&D: None
Net cost estimate: $ 2,000
Date: 12/82

7. **Financial Schedule**

Fiscal year	Authorizations	Appropriations	Obligations	Costs
Prior	13,980	13,980	13,846	7,560
1982	2,880	2,880	1,758	5,649
1983	1,000	1,000	2,256	3,918
1984	2,000	2,000	2,000	1,533
1985				1,200

		Costs				
Fiscal year	Obligations	FY 1981	FY 1982	FY 1983	FY 1984	After
1981 (81-T-404)	3,000	306	1,989	705	0	0
1982 (82-F-505)	2,880	0	783	2,097	0	0
1983 (83-F-502)	1,000	0	0	267	733	0
1984 (84-F-101)	2,000	0	0	0	800	1,200
		306	2,772	3,069	1,533	1,200

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects for Energy Technology Centers   2. Project No. 84-FE-101

8. **Brief physical description of project:**

These funds provide for capital construction items which are not of sufficient magnitude to warrant line-item budgetary consideration, yet are essential to the safe, efficient operation of the Energy Technology Centers. The funds are dedicated to a number of improvements, alterations, and additions that include, but are not limited to, OSHA and DOE health and safety requirements; modifications to meet environmental requirements; proper equipment storage facilities as well as safe storage for fuels and oils; modification of existing laboratory space; upgrading of heating/cooling and electrical systems; roof replacement/repair; and other renovation of facilities to provide for efficient and, particularly, safe use of existing space.

9. **Purpose, justification of need for, and scope of project:**

General plant projects are a continuing requirement to maintain safe and efficient operating conditions, and to accommodate new program developments. Such changes in technical program requirements frequently result in the need for alterations or minor construction of items not previously anticipated.

General plant projects are necessary to meet requirements of property control and protection, to upgrade certain facilities to meet fire protection and safety criteria, and to meet changing center mission requirements.

10. **Details of cost estimate:**

	Total Cost
a. Design, engineering, inspection at about 10% of construction costs	$ 150
b. Construction costs	1,550
c. Contingency at approximately 18% of above costs	300
Total construction project cost:	$ 2,000

11. **Method of performance:**

Designs will be accomplished on the basis of negotiated fixed fee contracts to the extent possible. Procurement and construction will be accomplished by fixed price contracts awarded on the basis of competitive bids.

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects for Energy Technology Centers   2. Project No. 84-FE-101

12. Funding schedule of project funding and other related funding requirements:

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements:

Not applicable.

14. Incorporation of fallout shelters:

Items to be constructed as part of this project are not suitable for use as fallout shelter.

15. Pollution prevention; abatement and control:

The total cost of the project where applicable include costs of those measures necessary to assure compliance with Executive Order 11752.

16. Evaluation of flood hazards:

Items to be constructed as part of this project will be located in an area not subject to flooding determined in accordance with Executive Order 11988.

17. Environmental impact:

Items to be constructed as part of this project will be in compliance with the National Environmental Policy Act and other applicable related statutes and will not be located in a floodplain/wetland.

18. Accessibility for the handicapped:

Items to be constructed as part of this project will be accessible to the handicapped in accordance with the Architectural Barriers Act, P.L. 90-840, and implementing instructions in the Federal Property Management Regulations (41 CFR 101-91.6).

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
PETROLEUM RESEARCH AND DEVELOPMENT

VOLUME 6

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Petroleum
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Advanced process technology (FE)				
Advanced exploratory research:				
Operating expenses	$ 3,552	$ 3,500	$ 3,500	$ 2,150
Subtotal	3,552	3,500	3,500	2,150
Arctic and offshore research:				
Operating expenses	...	1,500	1,500	750
Subtotal	...	1,500	1,500	750
Total				
Operating expenses	3,552	5,000	5,000	2,900
Capital equipment	480	...	...	...
Advanced process technology	$ 4,032	$ 5,000	$ 5,000	$ 2,900
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$ 5,000
Program increases and decreases:	
Advanced Exploratory Research	
o Terminate light oil mining in the advanced extraction technology effort and reduce process and utilization technology development	-1,350
Arctic and Offshore Research	
o Reduce participation in fundamental Arctic research on seafloor engineering, sea-ice dynamics, and oil spill phenomena	-750
FY 1984 budget request	$ 2,900

Advanced process technology:

Goals/Objectives:

The goal of the Advanced Process Technology (APT) program is to pursue the identification and development of advanced extraction, processing, and utilization concepts and technology related to oil, gas, tar sands, shale oil and unconventional hydrocarbons.

The objectives of this activity are to:

- o Assist industry in developing novel and innovative technology (e.g., microbial EOR) for increasing the recovery/extraction efficiency of oil, gas and shale oil from domestic fossil resources.
- o Perform fundamental research on methane hydrate and abiogenic gas formations in support of the Unconventional Gas Recovery (UGR) program.

- Develop new, improved analytical methodology and the instruments necessary for determining the physical/chemical properties and the composition of liquid fossil fuels and their products.
- Conduct fundamental research related to the identification, isolation, and environmentally acceptable removal of toxic products from heavy crude, shale oil, and tar sand bitumen.
- Conduct basic research and advanced development in long-range, high-risk technology related to both deep sea and harsh Arctic environments.
- Conduct technology transfer of data/information with both the private sector and other government organizations.
- Coordinate, assess, and plan Fossil Energy advanced research, including international and crosscut activities.

FY 1983 Accomplishments:

FY 1983 expected accomplishments include:

- Develop stability test standards for various fuels, particularly for shale oil.
- Computerize crude oil and shale oil data banks.
- Prepare and lab test new asphalt product derived from shale oil and tar sand bitumen.
- Complete planning and initial research studies for Arctic and Offshore program.
- Characterize fossil resources and products and conduct research in thermodynamics.
- Foster the development of a joint U.S.-I.E.A. research project to be centered at the Sandia National Laboratory Combustion Facility.
- Initiate a study with the National Academy of Sciences to identify and prioritize scientific research areas most germane to fossil energy technologies.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Advanced exploratory research	$ 3,500	$ 2,150	$-1,350

The FY 1984 funding decrease of $1,350,000 in the Advanced Exploratory Research subactivity reflects a narrowing of the scope of Governmental efforts in the development of improved extraction, processing and utilization technologies. While research activities will continue to increase our fundamental understanding of the physical, chemical and thermodynamic properties of fossil-derived liquid fuels, the development of specific processing and utilization technologies will generally be left to industry.

The advanced exploratory research subactivity will continue efforts in: the characterization of heavy ends, separation development, crude oil analyses, instrument and technique development, thermodynamic property studies of organic nitrogen compounds, and storage/handling fuel stability studies. Specific emphasis will be on the characterization of Cerro Negro heavy crudes under our cooperative agreement with Venezuela and on fundamental research to mitigate the environmental and stability problems associated with many fossil-derived liquids. In addition, a small number of advanced research projects will be supported, including international programs as well as crosscutting assessments of Fossil Energy's research activities. These activities provide integration of research and exploratory development activities and provide an effective means for applying advancements in one technology to solve problems in another.

Arctic and offshore research	$ 1,500	$ 750	$ -750

The FY 1984 funding decrease of $750,000 in the Arctic and offshore research subactivity will have little impact on DOE's effort in monitoring and coordinating all energy-related Federal Arctic research activities. This funding decrease reflects diminished participation in direct support of specific research studies into fundamental areas such as seafloor engineering, sea-ice dynamics, and environmental issues of oil spill phenomena and of atmospheric pollutants.

During FY 1983, DOE, based on recommendations from other Federal Agencies concerned with activities in this area, began efforts to coordinate research activities, including the establishment of a coordinated Arctic data file, analytical models for both Arctic and offshore characterization, and coordinated offshore data files. This work will ensure that all ongoing relevant Arctic research results will be readily available to industry for accelerating Arctic oil and gas development.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Advanced Process Technology

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Advanced Exploratory Research	Characterize fossil resources and products and conduct research in thermodynamics; computerize crude oil and shale oil data bases.	Continue, but at a reduced level, basic reasearch into separation development, crude oil analyses, instrument and technique development, storage/handling fuel stability studies regarding petroleum products and resources.
		Perform basic research on Cerro Negro heavy crudes under a cooperative agreement with Venezuela.
Arctic and Offshore Research	Establish coordinator role for energy-related Government Arctic research activities.	Continue coordinator role.
	Complete planning and initial research studies for Arctic and Offshore program.	Reduce direct support of specific research studies into fundamental areas such as seafloor engineering, sea ice dynamics, and environmental issues of oil spill phenomena and of atmospheric pollutants.

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

Fossil Energy Activities - Plant and Capital Equipment
Advanced Research and Technology Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Wastewater treatment facility, Morgantown, West Virginia

2. Project No. 83-F-501

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3. Date A-E work initiated: 2nd Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 1th Qtr. FY 1985

5. Previous cost estimate: $ 5,300
Date: 12/81

6. Current cost estimate: $ 5,300
Less amount for PE&D: None
Net cost estimate: $ 5,300
Date: 12/82

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7. Financial Schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1983	800	800	800	800
1984	2,000	2,000	2,000	1,550
1985	2,500	2,500	2,500	2,950

8. Brief physical description of project:

This project consists of the design and construction of a new industrial wastewater treatment plant for the entire complex of the Morgantown Energy Technology Center (METC). The facility will combine biological with physical-chemical treatment of waste water containing high levels of heavy metals, total organic carbon, and priority pollutants. Effluent wastewater will be recycled on demand for process cooling water and the excess water will be discharged to the Monongahela River. The facility will utilize environmentally acceptable methods for handling sludges.

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Wastewater treatment facility, Morgantown, West Virginia

2. Project No. 83-F-501

8. **Brief physical description of project:** (cont'd)

The treatment building will be a single story structure approximately 50 x 75 feet in size and constructed with pre-engineered insulated metal. It will utilize a 480 volt/500 amp and 208-110 volt/250 amp electrical service, air power for instrumentation and tool operation and steam heat with a condensate return. A 281,250 gallon concrete storage basin will be built upstream to collect the wastewater prior to treatment. In addition, the existing sanitary wastewater facility will be upgraded to meet permit limitations.

The FY 1983 budget request will provide for the initiation of engineering and design efforts.

9. **Purpose, justification of need for, and scope of project:**

METC is required to meet effluent permit limitations under the NPDES program of the Clean Water Act. METC holds an interim discharge permit which expired in December, 1981. METC has requested an extension of the permit and is currently operating on the basis of a verbal approval. The requested extension of the permit calls for completion of construction and system start-up by December 1984. Specialized wastewater treatment is required due to the nature of the contributing processes whereby toxic by-products of coal gasification appear in the waste streams. The facility will be capable of processing all of METC's wastewater in the treatment of approximately 225,000 gallons per day with an anticipated discharge of 7,000 gallons of treated water into the Monongahela River.

10. **Details of cost estimate:**

	Item Cost	Total Cost
a. Engineering, final design, and inspection @ 20% of construction costs, item b ..		$ 700
b. Construction costs		3,525
(1) Improvements to land including upgrading and gravel roadway	$ 675	
(2) Building and containment reservoir	1,700	
(3) Equipment including sludge dewaterer, clarifiers, pumps, monitoring equipment, etc.	1,150	
Subtotal		4,225
c. Contingency at appoximately 25% of above costs		1,075
Total project cost		$ 5,300

FY 1984 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Wastewater treatment facility, Morgantown, West Virginia

2. Project No. 83-F-501

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements:

	FY 1983	FY 1984	FY 1985	Total
a. Total project funding				
1. Total facility costs, construction	$ 800	$1,550	$2,950	$5,300
2. Other project funding	0	0	0	0
Total project funding	$ 800	$1,550	$2,950	$5,300

b. Total related funding requirement (estimated life of project: 25 years)

1. Facility operating cost	$183
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but to program effort in the facility	0
4. GPP or other construction related to program effort in the facility	0
Total other annual funding requirements	183

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Total facility costs
      No narrative required.

   2. Other project funding
      No narrative required.

b. Total related funding requirements
   1. Facility operating costs - Includes janitorial services, supplies and routine maintenance.

1.	Title and location of project: Wastewater treatment facility, Morgantown, West Virginia	2.	Project No. 83-F-501

14. Incorporation of fallout shelters:

Items to be constructed as part of this project are not suitable for use as fallout shelter.

15. Pollution prevention; abatement and control:

The total cost of the project where applicable include costs of those measures necessary to assure compliance with Executive Order 11752.

16. Evaluation of flood hazards:

Items to be constructed as part of this project will be located in an area not subject to flooding determined in accordance with Executive Order 11988.

17. Environmental impact:

Items to be constructed as part of this project will be in compliance with the National Environmental Policy Act and other applicable related statutes and will not be located in a floodplain/wetland.

18. Accessibility for the handicapped:

Items to be constructed as part of this project will be accessible to the handicapped in accordance with the Architectural Barriers Act, P.L. 90-840, and implementing instructions in the Federal Property Management Regulations (41 CFR 101-91.6).

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Petroleum
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Enhanced oil recovery (FE)				
Heavy oil:				
Operating expenses	$ 6,816	$ 1,583	$ 1,583	$ 3,700
Subtotal	6,816	1,583	1,583	3,700
Light oil:				
Operating expenses	3,840	4,392	4,392	6,550
Subtotal	3,840	4,392	4,392	6,550
Tar sands:				
Operating expenses	4,800	525	525	1,000
Subtotal	4,800	525	525	1,000
Total				
Operating expenses	15,456	6,500	6,500	11,250
Capital equipment	720	...	...	...
Enhanced oil recovery	$16,176	$ 6,500	$ 6,500	$11,250
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$ 6,500
Program increases and decreases:	
Heavy Oil	
o Expansion of fundamental research in flow properties, combustion kinetics, steam mobility control, steam additives, and thermal mapping	+2,117
Light Oil	
o Increased effort in rock/fluid interactions, mobility control, chemical stability, predictive models, data base development and technology transfer	+2,158
Tar Sands	
o Increase experimental work using block test apparatus for in situ recovery study and defining process parameters for steam flooding and in-situ combustion recovery	+475
FY 1984 budget request	$11,250

Enhanced oil recovery:

Goals/Objectives:

The goal of the Enhanced Oil Recovery (EOR) program is to conduct generic technology base R&D activities and to assist industry in obtaining a better understanding of the mechanisms and behavior of advanced and novel EOR processes for heavy oil, light oil, and tar sands.

The potential for EOR can be put in perspective when one realizes that only one-quarter of the oil discovered to date has been produced. Even the most optimistic projections for future oil recovery estimate that nearly two-thirds of the discovered oil will not be recovered. At present, some of the most advanced, high recovery EOR methods such as micellar-polymer for light oil and fire-flooding for heavy oil/tar sands are not sufficiently understood to be used with any degree of confidence. Other futuristic approaches such as microbial EOR are only now in a conceptual stage.

The effect of the focused R&D in EOR is illustrated by several reports published within the last two years. Utilizing current technology, the EOR contribution to the U.S. would be approximately 0.7 and 1.1 million barrels per day by 1990 and 2000, respectively. Advanced EOR technology potential is in the range of an additional 1.4 and 2.7 million barrels per day by 1990 and 2000, respectively. For comparison, current EOR production is 0.4 million barrels per day.

Because private industry can be expected to continue to improve upon existing EOR processes and to eventually develop new research areas in response to oil price increases, the EOR program now directs its primary emphasis on long-range, high-risk, technology base research with the main thrust on those elements that attract limited or no private venture capital, either because the risks are too high, or the payoffs are too far in the future.

The specific objectives of the EOR program are:

- Conduct fundamental, long-term research into the behavior of light oil EOR processes such as micellar-polymer and carbon dioxide flooding with mobility control for significantly higher recovery efficiency.
- Conduct fundamental, long-term research into the behavior of heavy oil EOR processes such as steam flooding, and in situ combustion utilizing advanced instrumentation and interpretation techniques.
- Provide technical support and conduct environmental research pertaining to hazards in use of chemicals in light oil recovery and to combustion products from thermal recovery of heavy oils.
- Continue technology transfer activities with government agencies and industry.

FY 1983 Accomplishments:

FY 1983 expected accomplishments include:

- Continue university research program to develop basic understanding of light oil EOR processes.
- Continue monitoring of ongoing cost-shared and ERA incentive test projects.
- Complete field evaluation of well string insulation.
- Continue three field experiments on steam with foam.
- Continue university research on improved heavy oil recovery processes.
- Complete a cost-shared miscible gas flood in Louisiana.
- Complete an in-depth analysis and tabulation of candidate U.S. reservoirs for miscible gas and chemical flooding.
- Complete assessment of the potential for mining of heavy oil and tar sands.
- Complete design and laboratory-scale testing of improved packers for use in geothermal and thermal EOR operations.

- Complete final report on the downhole steam generator tests.
- Release EOR project data base for public use.
- Publish generalized reservoir simulation model for use in screening EOR prospects.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Heavy oil	$ 1,583	$ 3,700	$ +2,117

An increase of $2,117,000 will permit an expansion of effort in fundamental research. Work performed in areas such as flow properties, kinetics of in-situ combustion, steam mobility control, additives for steam flooding, and thermal front mapping will be continued at universities and national laboratories.

The heavy oil subactivity focuses on improving the recovery efficiency of thermal processes. An improvement in recovery efficiency from the current 50 percent to a 60 percent level would increase available domestic reserves by an estimated two to three billion barrels and reduction of heat losses in deep wellbores could increase domestic reserves by one to two billion barrels.

The final report evaluating the long-term test of the downhole steam generator was completed in FY 1983 and no further funding for this project is requested as there is sufficient interest by the private sector to assume further testing and commercialization. Also in FY 1983, computer models for predicting incremental oil recovery and consumption of injected chemicals were developed for alkaline flooding technique. Work was initiated on optimizing a caustic flood for Wilmington Field reservoirs in California as well as research on physical properties, theory, and modelling of rock consolidation and completion techniques for horizontal holes (used in thermal recovery of heavy oil). Field testing was begun on controlled source audio-magnetotelluric (CSAMT) and high frequency electromagnetic (HFEM) tracking processes for thermal recovery.

The FY 1984 budget request permits a continuation of fundamental research into the behavior and mechanisms of heavy oil recovery processes. The following work is planned:

- Initiate studies on the effect of noncondensable gases with steam relative to improved oil recovery.
- Perform post-flood analyses of City of Long Beach and Aminoil's caustic floods.
- Begin experiments on unconsolidated formations in order to verify theory and model for horizontal holes (heavy oil mining R&D).
- Analyze results of controlled source and HFEM thermal front tracking results for an in situ combustion and/or steam recovery project.
- Complete the mathematical model for fuel deposition and related parameters of the in situ combustion process.
- Complete studies on the effect of pressure temperature on reservoir parameters and flow properties.
- Complete survey and analysis of potential techniques for determining steam quality and initiate development of test equipment of selected techniques.
- Begin combustion tube tests to determine the effect of using oxygen injection as an alternative to air injection on the kinetics of the in situ combustion process and model the results.
- Continue international research activities.

Light oil	$ 4,392	$ 6,550	$ +2,158

An increase of $2,158,000 will result in increased efforts in fundamental research, data base development and dissemination, and analyses of previously completed tests on EOR processes. It will also permit some post-test analyses of incentive field tests. Work being performed at universities and national laboratories will continue in areas of rock-fluid interactions, mobility control, chemical stability under field conditions, and predictive computer models. EOR data base development will allow the collection and publication of valuable data generated from the incentive field tests.

Improved recovery efficiency for light oil could add from 12 to 23 billion barrels to domestic crude oil reserves.

The following results were achieved during FY 1983: The EOR Project Data Base, which includes the Incentives Program projects, EOR Reservoir Data Base, and the Thermal, Chemical, and CO_2 Recovery Predictive Models, was released for public use. Laboratory research was completed and reported on effects of disulfonates, heterogeneous wettability, and polymer resistance factors, Burbank Field pilot post-mortem diagnostic analyses, statistical analyses of micellar-polymer data, and development of a semi-automated flooding apparatus for simultaneous runs. Reports on Predictive Reservoir Simulator Modeling and Mobility Control Research for CO_2 flooding were made available to industry. Laboratory investigations concerning CO_2 flooding using scale models to explain how CO_2 recovers residual oil and to predict recovery efficiency expected in field operations were completed. A continuous multiple control experimental apparatus was developed for studying the volumetric, phase composition, and fluid property behavior of CO_2-crude oil mixtures, and two CO_2 field flooding projects were completed. Finally, a test was conducted concerning the CO_2 displacement process for residual oil saturation after waterflooding.

The FY 1984 budget request permits continuation of fundamental research into the behavior and mechanisms of light oil EOR processes for chemical and gas miscible flooding. This work includes research directed at understanding the behavior of injected fluids and their interaction with reservoir rocks and fluids. The results from such work will allow better design of EOR processes and lead to improved recovery efficiency. Mobility control research will provide means to improve the sweep efficiency of gas injection. Studies such as interfacial tension effects, chemical reactions that lead to loss of effectiveness of injected chemicals, and stability of EOR chemicals at elevated temperatures and salinity will provide basic understanding into the miceller-polymer process and lead to practical design and field applications. Micellar-polymer may be the most promising light oil EOR technique. However, because of its complexity, it has not moved beyond the successful laboratory testing stage. Other generic research such as basic studies in coalescence in oil drops and emulsions in porous media, reduction of permeability heterogeneities, formation of oil banks in micromodels and cores, and quantitative measurements of CO_2 behavior with various crude oils will provide some of the necessary theoretical building blocks for devising more effective EOR processes.

Because of the large amount and diversity of data collected through this work and research projects in heavy oil and tar sands, information transfer plays a vital role in the overall research effort. Data collection activities such as ERA-incentive tests and post-test analyses will be continued.

The simplified reservoir simulation model and EOR predictive models (completed in FY 1983) will be utilized to aid the preliminary screening of field projects. This technical information transfer activity, taking place through published reports, presentations at public meetings, and technical seminars will fulfill the objective of providing basic technical data to industry and will aid in their efforts to design improved EOR processes.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Tar sands	$ 525	$ 1,000	$ +475

The increase of $475,000 will allow more experimental work to take place using the block-test apparatus. Work will also be performed in defining process parameters for thermal recovery of tar sand bitumen for steam flooding and in-situ combustion.

There is no current commercial oil production from the U.S. tar sands although recent estimates of domestic resources amount to 36 billion barrels. The tar sand bitumen cannot be produced through conventional oil recovery methods.

During FY 1983, a block-test apparatus was designed and built and made ready for laboratory experiments on consolidated tar sand samples. A series of tar sand recovery experiments using a tube reactor apparatus were completed. The test site at Vernal, Utah was brought into compliance with property use agreements and Utah state regulations. Documentation of LETC field experiments covering the Vernal tests was completed and report published.

The FY 1984 budget request will allow continuation of R&D efforts into displacement mechanisms, forward and reverse in situ combustion methods, hot fluid injection such as cyclic steaming and steam flooding, tar sand mining, recovery through underground mining and drilling techniques, environmental research for both air and water quality, and alternate extraction technologies. It will also enable the U.S. to continue technology exchange agreements with Venezuela and Canada, both of whom are moving aggressively ahead in tar sands technology.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Enhanced Oil Recovery

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Heavy Oil	Final report completed evaluating long-term test of downhole steam generator.	No activities planned for the downhole steam generator.
	Continue university research on improved heavy oil recovery processes.	Expand university research on improved heavy oil recovery processes.
	Work initiated on optimizing a caustic flood for Wilmington Field reservoirs in California.	Perform post-flood analyses of City of Long Beach and Aminoils caustic floods.
Light Oil	Continue university research program to develop basic understanding of light oil EOR processes. Release EOR Project Data Base and related models for public use.	Expand work at universities and national laboratories in such fundamental research areas as rock-fluid interactions, mobility control and predictive computer models.
Tar Sands	Design and make ready a block-test apparatus for laboratory experiments on consolidated tar sand samples.	Expand experimental work using the block-test apparatus for in situ recovery studies.
	Initiate work related to Canadian agreement on tar sands.	Continue technology exchange agreement with Canada.
	Perform basic research into tar sand technology.	Expand basic tar sand R&D research, including work on displacement mechanisms, in situ combustion methods, and steam flooding.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Petroleum
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Oil shale (FE)				
Oil shale technology base:				
Operating expenses	$16,176	$ 6,550	$ 6,550	$ 4,300
Subtotal	16,176	6,550	6,550	4,300
Environmental mitigation:				
Operating expenses	2,016	5,700	5,700	4,300
Subtotal	2,016	5,700	5,700	4,300
Total				
Operating expenses	18,192	12,250	12,250	8,600
Capital equipment	960	...	...	...
Oil shale	$19,152	$12,250	$12,250	$ 8,600

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$12,250
Program increases and decreases:	
Oil Shale Technology Base	
o Reduce scope of generic laboratory research	-2,250
Environmental Mitigation	
o Reduce effort aimed toward study of the kinetics and mechanisms of oil shale conversion reactions	-1,400
FY 1984 budget request	$ 8,600

Oil shale:

Goals/Objectives:

The goal of the Oil Shale R&D program is to develop a sound technology base to assist industry in the development of oil shale technology.

The oil shale resource in the United States is estimated to be about two trillion barrels of oil equivalent. The richest reserves of oil shale lie in the western states of Colorado, Utah, and Wyoming in areas of high environmental sensitivity. Substantial lower quality resources also occur in the east. The potentially recoverable oil shale resource is much greater than all of the oil reserves of the Middle East. However, none of this resource can yet be classified as reserves in the absence of demonstrated commercial performance (technical, environmental, and economic) of the first generation technologies now being implemented. This resource could easily support oil production on the order of millions of barrels per day, thereby contributing substantially to a reduction in imports, if technical, economic and environmental constraints can be overcome.

Oil shale technology is now in the process of transition from the laboratory and pilot plant stage to first commercialization attempts. Some commercial-scale modules are now in the construction phase with initial operation expected in the next few years. For these operations it is generally anticipated that the first plants can comply with current environmental standards with available technology. This should be satisfactory for individual plants. However, over a period of time, it will be necessary to mitigate environmental pollution because of regional impacts. It has been estimated by EPA that without these improvements the total oil shale industry may be limited to 400,000 bbls/day based on the amount of sulfur dioxide that will be emitted into the atmosphere.

Another constraint concerns water quality. It is estimated that if water is not cleaned and recycled, less than 1,000,000 bbls/day of shale oil may be produced in the Piceance Creek Basin.

The oil shale R&D program, in the past, has assisted private industry in the development of important areas of oil shale technology. For example, room and pillar mining and the forerunner of present commercial surface retorting methods were developed and demonstrated by the program in 1950-54 at the Anvil Point facility in Colorado (Union will employ room and pillar mining at their site) and vertical modified in situ retorting was conceived at the Laramie Energy Technology Center in the early 1960's (Occidental and Rio Blanco may both use updated versions of this technology).

FY 1983 was a transitional year from previous major project activities. As such, it was largely oriented to completion of data analysis from past projects and related publication activities and identifying generic research requirements to be addressed in the FY 1984 program. These activities are described in more specific detail, along with continuing research underway in FY 1983, under the appropriate subprogram requests for FY 1984.

The oil shale program is now directing its primary emphasis to long range, high-risk technology base research that will provide the basic underpinning for a future generation of oil shale processes. These processes will be characterized by reduced environmental impacts as much as practicable and increased resource recovery capability.

The specific objectives of the oil shale program are to:

- o Develop the technology base needed to help industry in overcoming environmental and technological barriers to shale oil development.
- o Obtain environmental data on impacts of oil shale development and develop environmental impact mitigation systems for the technologies under development.

FY 1983 Accomplishments:

The FY 1983 accomplishments include:

- o Continue series of bench scale tests at atmospheric pressure on quantifying parameters for low void retort operation.
- o Complete computer models for design and evaluation of modified in-situ retort abandonment strategies.
- o Complete evaluation of FY 1982 fragmentation tests.
- o Complete evaluation of Geokinetics horizontal modified in situ retorts in Utah.
- o Monitor progress on three eastern shale contracts testing novel process concepts.
- o Continue research on chemistry and kinetics of oil shale conversion with emphasis on mitigation of environmental impacts through process operating conditions.
- o Initiate planning and discussions with Union regarding potential environmental research at their commercial prototype retort site.
- o Continue research on specification of trace elements of potential environmental concern.

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Oil shale technology base	$ 6,550	$ 4,300	$ -2,250

The FY 1984 funding decrease of $2,250,000 results from the continuing shift, as discussed above, of this program to the high-risk generic research areas needed to develop new technology to meet national economic and security needs for liquid fuels, but which are too long range to provide industry an adequate market incentive to perform. Recent industrial cancellations or postponements of shale projects in the face of both economic and technical uncertainties emphasize the need for an improved technology base. Oil shale continues to be perceived as the second most abundant domestic source for liquid fuels, with a potential to provide a wider range of end-use products in high yields for the transportation, commercial, and industrial sectors than other synthetic liquids sources.

FY 1982-FY 1983 represents the culmination of several of DOE's past major generic research projects and the accompanying analysis and technology transfer as well as guidance to future program directions. Experimental work was completed in FY 1982 providing the chemical and kinetic paramaters of the one-dimensional process model of vertical modified in-situ retorting that has been under development by Lawrence Livermore National Laboratory (LLNL) for several years, and the FY 1983 effort included use of this model to complete analyses of data obtained from Occidental's retorts under previous DOE agreements. LLNL also completed development of generic mathematical computer models for surface processes in FY 1982. Because use of these models by DOE will be related to identifying retorting control parameters that can aid in reducing environmental emissions, experimental work to provide the chemical and physical data for insertion into these models was performed under the Environmental Mitigation sub-program in FY 1983. Industry is believed to have adequate proprietary data and/or incentives to develop such data for use with these models in economic analyses of their first generation process designs.

Continuing technology base laboratory efforts from FY 1983 include the development by the Laramie facility of the two-dimensional in-situ retort model. Also continued will be work on related improvements in chemical and kinetic parameters needed to address non-homogenous retorts that are generically closer to all "real-world" retorts than the ideal MIS case addressed by the one-dimensional model previously completed.

During FY 1983, contract studies for innovative concepts related to eastern shales were initiated as a result of a PRDA issued in FY 1982. These projects should be completed in FY 1984.

A series of laboratory tests at atmospheric pressure will be continued in FY 1984 in the low-void test facility both to determine the relative importance of bed parameters in designing in-situ retorts and to provide guidance to rock fragmentation designs. Recent cancellations or postponements by industry of vertical modified in-situ projects are believed to be strongly influenced by the high mining costs associated with present designs. Data and models are needed to support fragmentation designs that minimize void volume requirements while providing the high yields necessary for economic performance. It is to the nation's benefit to restimulate industrial interest in developing in-situ technologies, because of the potential such technologies have for reducing environmental impacts while increasing total resource utilization.

In the related area of rock fragmentation research, the fracture models are believed to be complete as to capability to predict rock breakage or cracking caused by explosives (as opposed to predicting the particle movement to form rubble and void distribution). These models were used in FY 1982-FY 1983 to evaluate experiments and data obtained from working with an industrial consortium. Preliminary analysis of these experiments has indicated that data was not obtained to verify the fracture models below the plane of explosive emplacement, and that explosive gas effects not presently incorporated in the models probably have a major influence on rubble and void distribution. A preliminary test plan to fill these data gaps was developed in FY 1982. It will be finalized in FY 1983 along with completion of evaluation of the test data obtained in FY 1982. Tests are expected to require continued work in FY 1984.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Environmental mitigation	$ 5,700	$ 4,300	$ -1,400

The reduction of $1,400,000 in the FY 1984 environmental mitigation research subactivity will diminish the effort involved in studying the kinetics and mechanisms of oil shale conversion reactions and their effect on pollutant formation (e.g., SO_x and NO_x).

The FY 1984 request provides for environmental mitigation research in the characterization of emissions and wastes from retorting processes so that environmental mitigation procedures can be designed, developed, and evaluated. The $4,300,000 budget request will also permit environmental research in the area of oil shale conversion chemistry as related to the formation of pollutants. This activity also includes required environmental compliance at past and present DOE research sites.

Environmental problems are the most severe non-economic constraint to large scale oil shale production. The objective of this activity is to develop solutions to environmental problems associated with the operation of shale retorting processes. The R&D strategy is to develop the data necessary to assist industry to mitigate problems for each of four environmental areas -- retort abandonment strategies, water management systems, solid waste management strategies, and air emission control procedures.

It is important to note that oil shale air emissions and water effluents have a chemical and biological nature that precludes the a priori use of existing environmental control devices. Specifically, hydrocarbon and trace metals in the off-gas pose serious problems for sulfur species removal, and long chain aliphatic and polycyclic aromatic hydrocarbons unique to shale oil, that are found in the process water, have to date resisted conventional water purification procedures.

In FY 1983, all previous retort abandonment information was collated and put on a computer. Various scenarios were developed by correlating abandonment methods with site specific geology and hydrology (e.g., Colorado lease tracts Ca and Cb). In FY 1984 these strategies will be transferred to industry for use.

Conventional large volume water treatment methods were applied to oil shale retort waters and their applicability evaluated. Several showing some promise were selected for modification through further research and will continue to be examined at laboratory scale in FY 1984. Experiments to integrate the best of these clean-up options into the process design will then be initiated. The concept of zero discharge (current industry plan) was investigated in FY 1983. The crude specifications on water quality, necessary to assure that acceptable air emissions that are generated when retort water is used to cool and moisturize spent shale, were determined. In FY 1984 the program will quantify the particulate and hydrocarbon emissions generated by this co-disposal. Water research will also continue to be conducted at a reduced level on the interaction between water, air pollutants, and oil during the retorting process.

The major environmental problems associated with long-term production of oil shale from surface retorting are the disposal of retorted shale and the control of air emissions. Spent shale disposal remains one of the most critical problems of developing a shale oil industry. Stabilizing the massive waste piles from a structural standpoint; controlling water run-off, penetration into the pile, and resultant leachates; and revegetation are essential elements of solid waste management. To effectively carry out these functions requires a basic understanding of the spent shale properties both from a physical and chemical standpoint. In FY 1983 the program surveyed the nature, magnitude, and time dependence of the major and trace element concentrations in the leach water from spent shale piles as a function of the raw shale numerology, retorting conditions, and spent shale mineral assemblages. In FY 1984 these experimental studies will focus on retorting variable regimes characteristic of surface retorting processes.

Also, in FY 1984, research will be continued in the laboratory developing several solid waste management strategies to include lysimeter testing, fugitive emissions, pile stability engineering, instrumentation and monitoring, and impacts of waste pile location on hydrology.

The air emissions research efforts will continue studying the relationships of physical and chemical control mechanisms to advanced processes. Particular emphasis will be placed on determining the functional relationships between process conditions and the efficiency of sulfur species removal, both in terms of overall percentage capture and selectivity with respect to carbon dioxide.

Diagnostic support will be continued in FY 1984. Examples of this work include development and application of improved X-ray, Nuclear Magnetic Resonance (MNR), and other spectroscopic techniques for analysis and monitoring of products and chemical reactions.

In FY 1983 the program initiated the development of a uniform credible data base necessary for the evaluation of the environmental acceptability of oil shale processing. The major problem in the development of this data base is the absence of proven analytical techniques for oil shale water and air emissions. During FY 1983 infrared and liquid chromatography methods to "finger print" retort water were developed and will be verified in FY 1984. This will allow researchers in different laboratories to identify their respective samples and compare results of clean-up experiments.

In FY 1983 an analytical method was developed that quantitatively determined greater than 99% of the sulfur species in off-gas. This procedure was verified at the Geokinetics operation in Vernal, Utah. This is the first quantitative analysis technique for all important sulfur species in retort gas streams and will be transferred to industry and other government agencies for their use in FY 1984. Arsenic is another element of major concern, and during FY 1983 work was initiated to study how arsenic forms partitions between the gas, oil, water, and spent shale. This work will continue in FY 1984.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Oil Shale

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Oil Shale Technology Base	Conduct basic generic laboratory research on the chemistry and physics of oil shale processes.	Continue generic laboratory efforts at a reduced scope.
	Study innovative concepts related to Eastern oil shales.	Complete innovative concept studies regarding Eastern shales.
Environmental Mitigation	Study kinetics and mechanisms of oil shale conversion and their environmental implications.	Reduce level of effort in the study of kinetics and mechanisms of oil shale conversion reactions and their effect on pollutant formation (e.g., SO_x and NO_x).
	Complete computer models for design and evaluation of modified in situ retort abandonment strategies.	Transfer information concerning abandonment strategies to industry.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Petroleum
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Program Direction (FE)				
Headquarters:				
Operating expenses	$ 1,555	$ 600	$ 600	$ 600
Subtotal	1,555	600	600	600
Enetgy technology centers:				
Operating expenses	...	3,450	3,450	...
Subtotal	...	3,450	3,450	...
Total				
Operating expenses	1,555	4,050	4,050	600
Program Direction	$ 1,555	$ 4,050	$ 4,050	$ 600

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$ 4,050
Program increases and decreases:	
o This amount will be revised to be consistent with direction provided with the FY 1983 Appropriations Act as soon as final definitions and allocations for direct and indirect ETC operating expenses have been established for FY 1984	-3,450
FY 1984 budget request	$ 600

The FY 1984 request of $600,000 for Program Direction for the Petroleum Program will provide funds for salaries, benefits and travel for 8.6 FTE's at Headquarters. The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

The Headquarters staff provides the overall direction and execution of a diverse research and development program aimed at enhanced oil recovery, recovery of oil from oil shale, and adding to the fundamental knowledge in oil recovery and shale oil development. In carrying out this responsibility, the staff: implements DOE policy and communicates this policy to the Energy Technology Centers; sets program objectives, develops program plans, and evaluates alternative program strategies; develops and defends budget requests to OMB and the Congress; approves procurement plans and monitors work progress; and evaluates projects and approves revisions to work plans as required to attain desired program goals.

The proper coordination and direction of program activities requires close and active participation by Department management in contract selection and in frequent management reviews of ongoing projects. The complexity of the program, the geographic distribution of the research efforts throughout the United States, and the intensive and frequent reviews necessary to manage these efforts requires constant coordination with performing organizations.

The FY 1984 request does not currently reflect the reallocation of funding between program activities and the ETC Program Direction account necessary to conform with guidance provided with the FY 1983 Appropriations Act. The corrected amounts will be provided to Congress in the near future when final definitions for direct and indirect ETC operating expenses have been established and revised estimates developed for FY 1984.

In addition, 26.4 FTE's are requested for the Energy Technology Centers (ETC's) to execute the day-to-day project management functions for assigned programmatic areas. ETC's personnel perform in-house R&D functions and manage industrial and university contracts and National Laboratory R&D efforts. Typical work activities performed include contract and National Laboratory monitoring, performance of technical evaluations, development of project and procurement plans, dissemination of technical data, and other activities related to program and site support.

DEPARTMENT OF ENERGY
FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
GAS
VOLUME 6

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Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Gas
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Unconventional gas recovery (FE)				
Eastern gas shales:				
Operating expenses	$ 2,496	$ 3,000	$ 3,000	$ 1,000
Subtotal	2,496	3,000	3,000	1,000
Western tight gas sands:				
Operating expenses	6,720	9,900	9,900	3,000
Subtotal	6,720	9,900	9,900	3,000
Methane from coalbeds:				
Operating expenses	1,920	...	...	...
Subtotal	1,920	...	...	...
Environmental and advanced research:				
Operating expenses	384	1,000	1,000	1,000
Subtotal	384	1,000	1,000	1,000
Total				
Operating expenses	11,520	13,900	13,900	5,000
Capital equipment	192	...	...	...
Effect of FY 1981 deferral	-3,000	...	...	...
Unconventional gas recovery	$ 8,712	$13,900	$13,900	$ 5,000
Staffing				
FTP/Total FTEs				

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1983 Appropriation enacted	$13,900
Program increases and decreases:	
Eastern Gas Shales	
o Reduced level of research effort in rock mechanics, reservoir fluid flow, instrumentation, and model development	-2,000
Western Tight Gas Sands	
o Laboratory research, including reservoir modeling, rock mechanics, and fracture diagnostics will be carried out at a reduced level	-6,900
FY 1984 budget request	$ 5,000

Unconventional gas recovery:

Goals/Objectives:

Natural gas currently supplies about 25 percent of the total energy consumed in the United States. For almost ten years, the annual addition of gas reserves from new discoveries has been less than the withdrawals from existing, proved reserves, although since the late-1970's the difference between withdrawal and additions has been steadily decreasing. This change is a result of increased exploration activity resulting from natural gas partial price decontrol. This trend has shown that considerable conventional shallow and deep gas may be available for immediate use, and that gas resulting from successful research on unconventional resources, combined with this conventional gas, represents a secure domestic supply that could meet the nation's needs into the next century, including displacement of imported oil. The Unconventional Gas Recovery program has the goal of assisting the private sector in developing cost-effective diagnostic and extraction technologies required to produce gas efficiently and economically from the vast unconventional gas resources. These unconventional sources of gas include the eastern Devonian gas shales, western gas sands, methane from coalbeds, methane hydrates, and abiogenic gas.

Currently, these unconventional gas resources are under-utilized because there are substantial economic and technical problems relating to their exploration, stimulation and production. The technological problems requiring solution are complex. However, these resources are immense and if they can be economically produced, they will represent a secure source of clean energy that could displace a significant volume of imported oil. The Federal role is one of complementing industry efforts in those R&D areas required to achieve increased production of unconventional gas resources.

The specific objectives of the Unconventional Gas Recovery Program are to:

- Reduce the uncertainty surrounding the producing characteristics of reserves for each of the designated unconventional gas resources.
- Develop and improve extraction technologies to the point of readiness for commercial development.
- Transfer all technical and economic data to industry.

Major program elements to meet program goals and objectives are:

- Geology/Reservoir Data Analysis - to identify favorable areas in basins worthy of industry exploration.
- Geoscience/Geotechnical Field Experiments - to understand reservoir production performance and to quantify the effects of stimulated vertical wells for effective gas recovery.

FY 1983 Accomplishments:

Anticipated FY 1983 accomplishments include:

- Completion of a third well for the multiwell experiment (Western Gas Sands).
- Completion of a fracture stimulation in a lenticular tight sand basin, including prefrac, postfrac testing, and data analysis and reporting (Western Gas Sands).
- Completion of a proppant transport model (Western Gas Sands).
- Completion of a geologic/engineering report on lenticular sands of the Piceance Basin (Western Gas Sands).
- Completion of a second offset well experiment in a different area of the Appalachian Basin (Eastern Gas Shales).

Budget Request By Subactivity:	FY 1983 Appropriation	FY 1984 Request	Net Change
Eastern gas shales	$ 3,000	$ 1,000	$ -2,000

The Eastern Gas Shales Subprogram is a multi-disciplinary research effort directed toward developing a technical data base to help private industry increase the capability for natural gas production from the Devonian shales of the Appalachian, Illinois, and Michigan Basins of the eastern United States. A preliminary estimate of the resource base in the National Petroleum Council report indicates some 12-39 trillion cubic feet (Tcf) of potentially recoverable gas reserves. Potential benefits from program activities have included establishing the extent and development potential; understanding the nature of containment of the gas and development of applicable extraction technology; and providing cost and performance data in specific resource areas.

Project management activities for all eastern gas shale research have been delegated to the Morgantown Energy Technology Center (METC), Morgantown, West Virginia.

The FY 1984 funding request allows for the continued integration of all shale data into the Eastern Gas Shale projects data base. This data base is essential for effective technology transfer to industry. Research in rock mechanics, reservoir fluid flow, instrumentation, and model development will be continued at a lower level of effort.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Western tight gas sands	$ 9,900	$ 3,000	$ -6,900

The Western Gas Sands subprogram is a coordinated research program directed at increasing the capability for gas production from the low permeability (tight) gas sandstones of the Western and Southwestern United States. Initial emphasis had been on the Piceance (Colorado), Uinta (Utah), Great Plains (Montana, North Dakota) and Greater Green River (Wyoming) areas. These are the areas where greatly increased production from both lenticular and blanket sandstone reservoirs is likely if economic incentives remain and if extraction problems can be solved. These reservoirs hold over 600 Tcf of potentially recoverable gas. The objectives have been to determine the extent, magnitude, and development potential of the resource, establish the frequency, distribution, and geometry of the tight sandstone reservoirs, and provide cost and performance data to aid the private sector in future resource development. The focus has been on the lenticular formations that are most difficult to extract, and thus are not being researched or exploited by the private sector even though the lenticular sands hold over half of the potential gas reserves.

Better solution of two critical problems is required before the commercial potential of this unconventional natural gas resource can be realized. First, there is a need for better reservoir diagnostic tools and interpretation techniques that will permit satisfactory evaluation of these reservoirs and provide data for effective and efficient wellbore fracture designs. Second, controlled and cost-effective wellbore fracturing techniques must be developed and demonstrated to be effective for more rapid transport of the gas from the rock formation matrix to the wellbore where it would be available for production.

A multi-well field experiment (MWX) consisting of three field tests and integrated supporting research programs have been established to address these problems. Two of the three wells were drilled through a lenticular sand reservoir in Colorado prior to FY 1983. A third well test was scheduled for FY 1983. A series of scientifically-based and well-instrumented tests have been designed to determine the reservoir characteristics and the optimum methods to extract the gas. Geologic effort to extend the MWX results to other basins is being provided by the USGS under an interagency agreement. There are also ongoing contracts for rock mechanics studies, reservoir analysis, diagnostic instrument development, and stratigraphic delineation.

Overall project coordination of the Western tight gas sands research is provided by the Morgantown Energy Technology Center with day-to-day MWX integration and management provided by the professional staff of the Bartlesville (Oklahoma) Energy Technology Center.

Data obtained in FY 1983, which includes a third well and a blanket stimulation in the multi-well experiment will form the basis for a field testing program in FY 1984. The FY 1984 funding request will provide funds for the completion of the stimulation and production testing of a lenticular sand reservoir at the multiwell site. This work will include stimulation design and prefracturing and postfracturing testing data analyses.

Geological geophysical models of the multiwell site will continue to be developed, however at a reduced level of effort. This level of funding will not support the present laboratory program and therefore such activities as reservoir modeling, rock mechanics, fluid mechanics, and fracture diagnostics will be carried out at a reduced level.

	FY 1983 Appropriation	FY 1984 Request	Net Change
Environmental and advanced research	$ 1,000	$ 1,000	$ ...

The novel unconventional gas resources activity is a new research initiative under the Environmental and Advanced Research subprogram. This new activity is primarily directed toward substantiating and characterizing the gas resource potential of methane hydrates and deep source gas (abiogenic). Most of the interest in methane hydrates, a frozen gas-ice mixture, stems from estimates of 400 Tcf (U.S. territory) of potential reserves of this form of natural gas. It is believed that this gas is trapped within and below the permafrost and beneath the ocean bottom of the U.S. Arctic and continental slope. Except for a methane hydrate core recovered off the coast of Guatemala, the dimensions and properties of naturally occurring methane hydrate concentrations and the potential and economics of producing them is unknown. Deep source gas (abiogenic) is that gas which may originate in areas below the level of current industry drilling or approximately 30,000 feet in depth. Interest in deep source gas is motivated by the prospect that confirmation of its existence could substantially revise current views regarding where natural gas can be found and produced in commercial quantities and estimates of the U.S. and world's remaining natural gas resource. Required are methods for detecting its origin, theories of migration, and concepts for entrapment. Without this knowledge of deep source gas, estimates of resource and/or reserves of any kind are precluded. The novel unconventional gas initiative, in accordance with Administration policy, is very long-term, high risk research and development. A federal role is emphasized to provide coordination, integration and syntheses of program elements that will ultimately establish an estimate of reserves (producible gas) for methane hydrates and deep source gas. The UGR program in these areas complements fundamental research being done on methane hydrate and abiogenic gas formations under the Advanced Process Technology subprogram.

FY 1984 funds for the Environmental and Advanced Research program will provide for the following:

- Acquisition of hydrate core from a well of opportunity.
- Collection of well log data for the identification of hydrate zones.
- Initiate lab tests of stimulated/natural methane hydrates for characterization.
- Evaluate areas of likely hydrate occurrences via lab/field research.
- Initiate evaluation and development of hydrate extraction/production techniques.
- Initiate development of a detection and differentiation system for deep source gas.

Project management activities have been delegated to the Morgantown Energy Technology Center (METC), Morgantown, West Virginia.

The FY 1984 request also will provide for the environmental assessments required for all field experiments. Efforts in these areas constitute primarily the support required to provide site evaluations and analytical support for the multi-well test facility in the lenticular gas sands.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Fossil Energy Research and Development
Unconventional Gas Recovery

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Eastern Gas Shales	Completion of a second offset well experiment and integration of eastern shales data.	Continued integration of all shale data into the Eastern Gas Shales projects data base.
Western Tight Gas Sands	Completion of a third well for the multiwell experiment. Completion of a fracture stimulation in a lenticular tight sand basin. Completion of a proppant transport model.	Field testing of multiwell and fracture stimulation experiments. Additional development of geological geophysical models. Data collection and analysis.
Environmental and Advanced Research	Complete environmental assessments for the multiwell and mineback experiments.	Data analysis of environmental assessments. Characterization of gas resource potential of methane hydrates and deep source (abiogenic) gas.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
Gas
Fossil Energy Research & Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Program Direction (FE)				
Headquarters:				
Operating expenses	$ 442	$ 200	$ 200	$ 200
Subtotal	442	200	200	200
Energy technology centers:				
Operating expenses	...	2,850	2,850	...
Subtotal	...	2,850	2,850	...
Total				
Operating expenses	442	3,050	3,050	200
Program Direction	$ 442	$ 3,050	$ 3,050	$ 200

Authorization: Section 4, P.L. 93-577
Section 301, P.L.95-91

Summary of Changes

FY 1983 Appropriation enacted	$3,050
Program increases and decreases:	
o This amount will be revised to be consistent with direction provided with the FY 1983 Appropriations Act as soon as final definitions and allocations for direct and indirect ETC operating expenses have been established for FY 1984	-2,850
FY 1984 budget request	$ 200

The FY 1984 request of $200,000 for Program Direction for the Gas program will provide funds for salaries, benefits, and travel for 2.0 FTE's at Headquarters. The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

The Headquarters staff is responsible for overall program direction. In carrying out this responsibility, the Headquarters staff: implements DOE policy and communicates that policy to the Energy Technology Centers; sets program objectives; develops program plans and evaluates alternative program strategies; develops and defends budget requests to the Office of Management and Budget and to the Congress; approves procurement plans; and monitors work progress, evaluates projects, and approves revisions in work plans as required to attain program goals.

The proper coordination and direction of the gas program requires close and active participation by Department management in contract selection and administration and requires frequent reviews by Headquarters staff with program responsibility. The complexity of the program, the geographic distribution of the research efforts throughout the United States, and the intensive and frequent reviews necessary to manage these efforts requires constant coordination with performing organizations.

The FY 1984 request does not currently reflect the reallocation of funding between program activities and the ETC Program Direction account necessary to conform with guidance provided with the FY 1983 Appropriations Act. The corrected amounts will be provided to Congress in the near future when final definitions for direct and indirect ETC operating expenses have been established and revised estimates developed for FY 1984.

In addition, 17.0 FTE's are requested for the Energy Technology Centers (ETC's) to execute the day-to-day project management functions for assigned programmatic areas. ETC's personnel perform in-house R&D functions and manage industrial and university contracts and National Laboratory R&D efforts. Typical work activities performed include contract and National Laboratory monitoring, performance of technical evaluations, development of project and procurement plans, dissemination of technical data, and other activities related to program and site support.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Naval Petroleum and Oil Shale Reserves

For necessary expenses in carrying out naval petroleum and oil shale reserves activities, [$222,000,000] including the purchase of not to exceed 3 passenger motor vehicles, $266,100,000, to remain available until expended.

Explanation of Change

Proposed language provides for the purchase of additional passenger motor vehicles.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

NAVAL PETROLEUM AND OIL SHALE RESERVES

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1	2	4	4
SUBTOTAL	2	4	4
GS-18			
GS-17			
GS-16			
GS/GM-15	8	14	11
GS/GM-14	14	14	14
GS/GM-13	11	15	15
GS-12	17	17	17
GS-11	22	22	21
GS-10	1		
GS-9	2	2	1
GS-8		2	3
GS-7	10	8	14
GS-6	5	8	6
GS-5	5	4	7
GS-4	3	7	7
GS-3			
GS-2			
GS-1			
SUBTOTAL	98	113	116
UNGRADED			
TOTAL PERMANENT POSITIONS	100	117	120
UNFILLED POSITIONS, END OF YEAR	1		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	99	117	120

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
NAVAL PETROLEUM AND OIL SHALE RESERVES
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$ 222,000	$ 266,100
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	8,862*	---
Unobligated Balances, End of Year	---	---
Total, Obligations	$ 230,862	$ 266,100

* Consists of $2,981,000 for ongoing Naval Petroleum and Oil Shale Reserves programs and $5,881,000 for Solar federal buildings and Fossil energy commercialization support programs, additional funds for which are not being sought.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
NAVAL PETROLEUM AND OIL SHALE RESERVES
(In thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves:						
NPR-1 & 2	$184,732	$201,228	$196,917	$212,531	$214,946	$210,809
NPR-3	21,326	21,541	19,855	20,424	45,633	40,399
NOSR	2,458	2,128	90	1,890	100	90
Program Direction	4,626	4,283	5,138	5,107	5,421	5,435
Subtotal, NPOSR	213,142	229,180	222,000	239,952	266,100	256,733
Solar Programs*	---	24,456	---	14,213	---	9,475
Fossil Programs*	---	5,445	---	2,945	---	1,963
TOTAL	$213,142	$259,081	$222,000	$257,110	$266,100	$268,171

* Reflects outlays from prior year funding of the Solar federal buildings and Fossil energy commercialization support programs.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Naval Petroleum and Oil Shale Reserves

The goal of the Naval Petroleum and Oil Shale Reserves (NPOSR) program, is to develop the Reserves, through exploration, drilling, construction, operation and maintenance activities, to their full production capacity to achieve the optimum capability for supplying petroleum during a national defense emergency; produce petroleum at the the rate established by law (P.L. 94-258); and sell or otherwise dispose of the petroleum as authorized by the Secretary of Energy. Currently, NPOSR sells all of the Government's share of crude oil produced from the Reserves, which is estimated to be 120,600 barrels of oil per day (BOPD) in FY 1983 and 112,700 BOPD in FY 1984, to the Department of Defense (Defense Fuel Supply Center). Natural gas and liquid by-products are sold through competitive sales to the highest bidder.

Naval Petroleum Reserve No. 1 (NPR-1), Elk Hills, located near Bakersfield, California, is operated predominantly under a unitization agreement (Unit Plan Contract) between the Government and Chevron U.S.A. Inc. Under this agreeement, all engineering decisions are approved by a two-member Operating Committee consisting of one Government Member and one Chevron Member. Operations are conducted by Williams Brothers Engineering Company under Government direction.

Total production at NPR-1 was 166,297 BOPD in FY 1982, and is expected to average approximately 151,000 BOPD in FY 1983 and 141,000 BOPD in FY 1984. The highest annual production from NPR-1 was achieved in FY 1981 when production averaged 171,500 BOPD, peaking at 181,000 BOPD. The Government share is approximately 78 percent of the total. Receipts from the sale of petroleum and related products are transferred to the U.S. Treasury and deposited either in the Miscellaneous Receipts or the Windfall Profit Tax accounts. Total receipts were about $1.7 billion in FY 1982, and are estimated to be $1.6 billion in FY 1983 and $1.5 billion in FY 1984. It is estimated that revenues will be maintained near the same level, with declining production offset by slightly higher gas and oil prices -- $28.57 per barrel in FY 1983 and $29.10 per barrel in FY 1984 -- and increase revenues from greater gas and gas liquids production. Chevron reimburses the Government for its share of the costs for unit operations at NPR-1, contributing approximately $52 million to such costs in FY 1982, which is deposited in the Miscellaneous Receipts account. Chevron's share of unit operation costs, included in the revenue estimates above, is estimated to be $56 million in FY 1983 and $63 million in FY 1984. Additional revenues of approximately $4 million per year are deposited in the Miscellaneous Receipts account from NPR-2 lease royalties and pipeline usage fees. Windfall Profit Taxes were $448 million in FY 1982, and are estimated to be $284 million in FY 1983 and $256 million in FY 1984. The decrease in Windfall Profit Taxes is due to passage of the Technical Corrections Act of 1982, which reclassifies NPR oil as tier 2 oil, which is taxed at a lower rate. Because this law is retroactive back to 1980, an additional $376 million in direct receipts will be reallocated to the Miscellaneous Receipts account in FY 1983 to correct prior year overpayment of Windfall Profit Taxes.

The current Development and Exploration Programs were initiated at NPR-1 in FY 1975. Since that time, 826 development wells and 29 exploration wells have been drilled. An additional 85 development wells and 3 exploration wells are scheduled for FY 1983, and 98 development wells and 5 exploration wells are planned for FY 1984.

The Development Facilities category is an on-going element of the NPR-1 program, meeting minor construction requirements and providing improvements for the efficient operation and development of the Reserve in response to changing field conditions. This request does not include funding for the California Development Facilities Project which was completed in FY 1982 with the exception of installation of three liquid products tanks, and repairs and modifications to the Shallow Oil Zone tank settings. The $5.6 million contract for the tank settings work was awarded in February 1982, with completion scheduled for September 1983.

Naval Petroleum Reserve No. 3 (NPR-3), Teapot Dome, located near Casper, Wyoming, produced an average of 3,145 BOPD in FY 1982. Production is estimated to gradually decline to 2,950 BOPD in FY 1983 and 2,650 BOPD in FY 1984. Increased production due to Enhanced Oil Recovery (EOR), is expected to take effect in FY 1986. Revenues at NPR-3 totaled $42.7 million in FY 1982, and are estimated to be $39.3 million in FY 1983 and $36.3 million in FY 1984, subject to changes in petroleum prices and actual reservoir performance. Of this amount, Windfall Profit Taxes were $11.9 million in FY 1982, and are estimated to be $7.8 million in FY 1983 and $6.7 million in FY 1984.

NPR-3 development was initiated simultaneously with open-up in FY 1976. The drilling program has resulted in 455 development wells drilled since open-up. Twenty-four wells were drilled in FY 1982, with 21 wells scheduled to be drilled in FY 1983 and 46 wells planned for FY 1984.

EOR efforts at NPR-3 are presently in the pilot testing phase, with enhanced field implementation scheduled to begin in FY 1984. Both pilots, polymer-enhanced waterflood and in-situ combustion, are operational and will be run into FY 1984. Successful application of either of these EOR technologies to the entire Shannon Reservoir could increase the amount of recoverable oil from the present 5 percent to 20-50 percent of the 180 million barrels of original oil-in-place over the life of the reservoir. Preliminary planning and design for a larger scale application of an EOR process could begin late in FY 1983, if the current pilot projects prove to be technically successful.

The goal of the Naval Oil Shale Reserves program is to prepare and preserve the Reserves for national defense. The Pre-development Plan for NOSRs 1 and 3, which are located in Colorado, was completed in FY 1982. Land management activities and limited environmental monitoring will be conducted in FY 1984 using existing facilities.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Environmental Protection, Safety, and Emergency Preparedness
Naval Petroleum and Oil Shale Reserves
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Naval Petroleum Reserves Nos. 1 & 2 (California)				
Operations & Maintenance...	$ 92,897	$ 102,267	$ 102,267	$ 113,678
Development Drilling.......	76,528	81,313	81,313	80,306
Development Facilities.....	7,188	3,837	3,837	8,458
Exploration Drilling.......	8,119	9,500	9,500	12,504
Subtotal.................	$ 184,732	$ 196,917	$ 196,917	$ 214,946
Naval Petroleum Reserve No. 3 (Wyoming)				
Operations & Maintenance..	$ 13,014	$ 12,605	$ 12,605	$ 18,215
Development Program.......	3,112	5,750	5,750	9,818
Enhanced Oil Recovery.....	5,200	1,500	1,500	17,600
Subtotal.................	$ 21,326	$ 19,855	$ 19,855	$ 45,633
Naval Oil Shale Reserves..	$ 2,458	$ 90	$ 90	$ 100
Program Direction				
NPR-1 & 2.................	$ 3,041	$ 3,357	$ 3,357	$ 3,013
NPR-3.....................	628	644	644	710
Headquarters..............	957	1,137	1,137	1,698
Subtotal.................	$ 4,626	$ 5,138	$ 5,138	$ 5,421
TOTAL	$ 213,142	$ 222,000	$ 222,000	$ 266,100
Staffing				
FTP/TOTAL	98/105	117/117	117/117	120/120

Authorization: P.L. 94-258

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Naval Petroleum and Oil Shale Reserves
(In thousands of dollars.)

FY 1983 Appropriation enacted	$	222,000
FY 1984 base	$	222,000
Program increases and decreases:		
NPR-1		
o Operations & Maintenance - additional operator personnel, increased maintenance and engineering requirements, California sales tax, expanded waterflood operations, and initial enhanced oil recovery activity	+	11,411
o Development Drilling - moderation of cost increases together with completion depths	-	1,007
o Development Facilities - continued level of effort to meet field requirements	+	4,621
o Exploration Drilling - drill two additional wells	+	3,004
Subtotal	+	18,029
NPR-3		
o Operations & Maintenance - increased operator personnel, security requirements, maintenance requirements, installation of automated MIS, and Wyoming sales tax	+	5,610
o Development Program - increased well drilling, and LTS plant modifications	+	4,068
o Enhanced Oil Recovery - expanded field operation	+	16,100
Subtotal	+	25,778
Naval Oil Shale Reserves - maintains level of effort	+	10
Program Direction		
o NPR-1 - miscellaneous salary and expense adjustments	-	344
o NPR-3 - miscellaneous salary and expense adjustments	+	66
o Headquarters - reimbursement for additional military positions, two additional FTE's, miscellaneous salary and expense adjustments	+	561
Subtotal	+	283
FY 1984 budget request	$	266,100

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Reserve Nos. 1 & 2 (California).................	$ 196,917	$ 196,917	$ 214,946

The FY 1984 budget request for NPR Nos. 1 and 2 (California) is $214,946,000, an increase of $18,029,000 over FY 1983. This request provides funding for Operations and Maintenance, Development Drilling, Development Facilities and Exploration Drilling. Operations and Maintenance will be greater in FY 1984 than FY 1983, primarily due to expanded waterflood operations, additional Unit Operator personel, increased reservoir engineering and maintenance requirements and funding for California sales taxes. Total operator personnel for FY 1984 will average 772, an increase of 44 over FY 1983. It is expected that the number of operator personnel will stabilize at this level in the outyears.

Development Drilling provides for an increase in the number of wells planned to be drilled. Moderation of cost increases to drill and complete wells during FY 1982 through FY 1984 together with projected well locations and completion depths is anticipated to allow NPOSR to drill more wells in FY 1984 than in FY 1983 for approximately the same amount of funding. The Exploration Drilling request is slightly higher, and will support two additional wells. The Development Facilities request increases to match the same level of effort whose funding in FY 1983 will be supplemented by $5,000,000 in carryover funding from the California Development Project.

Operations and Maintenance......................	102,267	102,267	113,678

The FY 1984 budget request for Operations and Maintenance supports day-to-day activities necessary to continue the maximum efficient rate of production at the Reserves. The amount requested in FY 1984 is an increase of $11,461,000. The following activities are funded under this category.

a) Production Operations	38,544	38,544	43,777

This activity provides for the following:

- maintenance and repair of pipelines, tank settings, valves, pumps, compressors, storage tanks, etc., used in the collection, storage and distribution of oil and gas;
- repair and fuel in field and mobile equipment;
- maintenance and repair of all roads;
- fresh water, waste water, and the waterflood injection systems;
- repair and maintenance of an electrical transmission and distribution system serving all facilities;
- electric power and miscellaneous utility items, environmental studies and maintenance for field buildings;
- operation, maintenance and repair of propane, butane and natural gasoline dispensing facilities, storage tanks and pipelines used in the distribution of products produced at the gas plants;
- minor well work (approximately 90 wells);
- operation and maintenance of EOR operations in the Tulare and Shallow Oil Zones;
- two hundred and forty-six Unit Operator personnel.

The requested increase is required to support the operations and maintenance costs of additional completed wells, expansion of the waterflood programs, and the EOR pilot operations.

b) Remedials $ 16,679 $ 16,679 $ 19,562

Remedials include the cost of major well work required to maintain existing wells in optimum producible condition and provides for completions and recompletions; casing failures; sand consolidation; injection profile control; gas/oil ratio control; well stimulation measures; artificial lift purchase and installations; abandonments; and tubing replacements. The total number of wells which will be affected by the remedial program will be 180 as compared with 167 major remedials scheduled in FY 1983.

The request is based upon the following:

- stimulation work to remove well-bore damage and increase production;
- evaluation and implementation of artificial lift methods for Stevens Zone wells no longer capable of free-flowing production;
- well stimulation and recompletion work in connection with expanded waterflood and EOR operations;
- remedial operations required to control excessive gas/oil ratios for Stevens wells in pressure maintained reservoirs.

The requested increase for FY 1984 is due primarily to the number and complexity of remedial jobs to be done. Revenues resulting from this remedial work are estimated to be approximately $180,000,000 in FY 1984.

c) Gas Operations 20,462 20,462 23,031

Gas Operations include the operations and maintenance of all the gas plants, which process approximately 350,000 MCF/D of natural gas. This includes the 3G Gas Plant, the 35R Gas Plant, the 35R High Pressure Injection Plant, Low Temperature Separation plant (LTS) No. 1, LTS No. 2, 33S Compressor Plant, gas injection wells, field compressor units, dry gas production, and the liquid products loading rack. This category funds 176 Unit Operator personnel. The requested increase is due to additional offsite plant usage to handle about 20 MMBTU of increased gas production, major overhaul and increased repairs of injection compressors, and increased preventive maintenance.

d) Drilling Supervision 447 447 620

Drilling Supervision provides for direct labor costs, outside services, and expendable supplies of the Unit Operator associated with the supervision and management of Development Drilling, Exploratory Drilling and Stevens Zone Remedials. Supplies and outside services include such items as chemicals, tank rentals, and mud and kill fluid maintenance to support day-to-day well activities. This category provides funding for 20 Unit Operator personnel. The requested increase in this area is related to increased costs for supplies and outside services and to support additional drilling and remedial work.

e) Technical Services 3,793 3,793 4,219

This category provides for the use of Unit Operator technical consultants such as facility engineers, petroleum engineers, and outside services such as drafting, construction, environmental, and telecommunications not charged to a specific job. This category provides funding for 56 Unit Operator personnel and related supplies and equipment. Increases are directly related to projected salary increases, and increases for outside services such as electricity for cathodic protection and corrosion chemicals.

f) Administrative Support $ 17,842 $ 17,842 $ 18,469

Administrative Support provides for activities connected with the daily operations of the Unit Operator. This includes financial, accounting, legal, secretarial, and related services support. In addition, it includes the purchase of safety equipment, office supplies, unit vehicle replacements and rentals, contractual automated engineering services, and reservoir engineering and geological studies.

Two-hundred and seventy-four Unit Operator Personnel out of a field wide total of 772 are funded in this category. This category includes $323,000 to lease new ADP equipment needed to replace existing equipment. The existing ADP equipment is fully utilized and cannot handle new accounting, engineering and production applications necessary to operate the Reserve in an economic and efficient manner. Increases are also related to additional Unit Operator personnel required for laboratory services, garage maintenance operations and reservoir engineering.

g) Operator Fee 4,500 4,500 4,000

The Operator Fee consists of both the base fee and award fee paid to Williams Brothers Engineering Company for operating the Reserve. Both base fee and maximum award fee are negotiated annually, and the award amount is based on evaluation of performance. The FY 1984 request represents the best estimate of the Unit Operations fee based upon historical performance, and the use of unawarded fee carried over from prior years.

Development Drilling............................... 81,313 81,313 80,306

This category provides for the drilling of development wells at NPR No. 1. The Development Drilling Program is designed to provide a variety of wells necessary to (1) maintain Stevens pool performance by gas injection (pressure maintenance); (2) enhance Stevens production by waterflood activity in the MBB, Northwest Stevens, 2B, and 24Z pools; (3) permit adequate drainage of reservoirs and maintain maximum production by additional in-fill wells; (4) provide step-out development wells to fully define Stevens Zone and Shallow Oil Zone reservoir limits; (5) provide closer spaced wells for the fractured shale; (6) provide new down structure wells to replace high gas/oil ratio wells; and (7) provide new wells for EOR projects in the Tulare and Shallow Oil Zones. The FY 1984 Development Drilling Program is distributed by Zone and Unit cost ($000) as follows:

ZONE	NO. OF WELLS	UNIT COST	TOTAL COST	PROJECTED REVENUES ANNUALIZED
Tulare	4	$ 276	$ 1,104	$ 1,489
Shallow Oil Zone	29	329	9,541	17,995
Stevens Shallow (Shale)	52	1,075	55,900	193,596
Stevens Shallow (Sand)	4	1,075	4,300	14,892
Stevens Shallow (Water Injection)	7	1,075	7,525	N/A
Stevens Deep NW "R" Area	1	1,364	1,364	3,723
Olig	1	572	572	621
TOTAL	98		$ 80,306	$ 232,316

Each Tulare well drilled will add an average of 30 BOPD to total production. The 4 development wells planned will utilize steam injection for the first time and contribute a total of approximately 120 BOPD.

Each Shallow Oil Zone well drilled will add an average of 50 BOPD to total field production. The 29 development wells planned will contribute a total of approximately 1,450 BOPD.

Each Stevens well drilled will add an average of 300 BOPD to field production. The 57 Stevens wells planned will contribute approximately 17,100 BOPD to field production upon completion of drilling.

The water injection wells provide pressure maintenance to certain Stevens reservoirs, as well as, a means of disposing of increased water production associated with waterfloods and normal production. The water injection wells have a direct effect on production by maintaining reservoir energy and increasing recovery efficiencies, but all production and revenues are allocated to the corresponding producing wells.

Development Facilities............................	$ 3,837	$ 3,837	$ 8,458

This category provides for the construction of on-reserve facilities required to support production. The FY 1983 request for Development Facilities will be supplemented by $5,000,000 in carryover funding from the California Development Project. Thus, the FY 1984 request will maintain the same level of effort as in FY 1983, and be used for new and on-going projects to meet field requirements.

The FY 1984 request provides for the following:

a) Stevens Zone Facilities ($4,134,000)

1. Provide electrical power to new Stevens Zone pumping wells. This includes the conversion of flowing wells to artificial lift.

2. Replace use of natural gas with compressed air for operating instruments at Stevens automated condensate collection traps and tank settings. This will prevent the venting of natural gas into the atmosphere. The estimated value of the gas vented is approximately $2,300,000. This project was begun in FY 1982 and will be approximately 98 percent completed with the funding requested in FY 1984. Minor modifications to fully complete the project will be done in FY 1985.

3. Provide an additional Stevens Zone tank setting to accomodate new wells drilled and allow for step-out drilling of Stevens wells located remotely from existing facilities.

4. Continue to convert Stevens Gas injection compressors to produce wells into the low pressure system.

b) Carneros Zone Facilities ($3,156,000)

1. Continue work initiated in FY 1983 to modify existing Carneros condensate production collection facilities. Due to declining reservoir pressure, which precludes production into the high pressure system, Carneros facilities must be modified to handle the lower pressures.

c) Connect 2B and 24Z Pools to Existing Waterflood System ($197,000)

1. Initiates pressure maintenance program in 2B and 24Z reservoir.

d) Cathodic Protection ($571,000)

1. Cathodic protection for new wells. This is a continuing program to prevent the corrosion of well casings.

e) Enhanced Oil Recovery Projects ($400,000)

1. Provide for steam generation and injection facilities needed for implementation of EOR pilot projects.

Exploratory Drilling............................ $ 9,500 $ 9,500 $ 12,504

This category covers the cost for exploratory drilling which has the potential to increase the proven petroleum reserves.

ZONE	NO. OF WELLS	UNIT COST	TOTAL COST	RECOVERABLE RESERVE POTENTIAL
Shallow Stevens	1	$ 1,539	$ 1,539	12 MMB
Deep Stevens	3	2,475	7,425	100 MMB
Carneros	1	3,540	3,540	5 MMB
TOTAL	5		$ 12,504	117 MMB

Shallow Stevens

The purpose of this well is to evaluate Stevens Zone potential in the Northwest part of Section 32R where good channel sands are postulated to exist. Estimated potential - 12 million barrels.

Deep Stevens

Three well locations will be determined from geophysical data acquired during FY 1982. Areas of interest will be the North Flank of the 31S structure, South Flank of the 31S structure adjacent to the South Coles Levee Anticline and possible follow-up drilling in Section 18H (NPR No. 2). Estimated potential - 100 million barrels.

Carneros

A well will be drilled on the Northwest Stevens structure to further evaluate the potential of thick Carneros sands with good gas and oil shows. Estimated potential - 5 million barrels.

Reserve No. 3 (Wyoming)............................ $ 19,855 $ 19,855 $ 45,633

The FY 1984 budget request for NPR-3 is $45,633,000, and provides funding for Operations and Maintenance ($18,215,000), Development Drilling ($9,818,000), and EOR ($17,600,000). This is an increase of $25,778,000 over FY 1983. The major increase is due to the planned commencement of EOR development in FY 1984.

Operations and Maintenance increases are due to additional contractor personnel, and increased program activity. Development drilling costs increase due to greater drilling activity. EOR increases significantly with the completion of the pilot projects and initiation of expanded application. Requirements for contractor/operator personnel, which will average 206 employees in FY 1984, are included in the program estimates.

Operations and Maintenance......................... 12,605 12,605 18,215

The FY 1984 budget request for Operations and Maintenance provides for the continuation of the day-to-day activities listed below. The increased request for FY 1984 represents adjustments for inflation, an increase of twenty-six technical and administrative staff, increased field security personnel and an increased operator/contractor fee due to greater activity related primarily to EOR.

a) Contractor/Operator Labor 2,340 2,340 2,616

This activity provides funding for project management, and field operations and maintenance performed by the NPR-3 Contractor/Operator (Lawrence-Allison West, Inc.). Project Management Services provide for overall management of operations including field operations, technical services, scheduling, planning, purchasing, accounting, personnel training and travel. Field operations and maintenance includes salaries for field supervision and labor, minor maintenance and repair activities, well testing, infield oil hauling, product testing, and materials and supplies. The FY 1984 request reflects the increased costs for labor, minor maintenance activities, supplies and materials.

b) General Support 3,100 3,100 5,465

This activity provides for the required branch office support for administration, engineering/geology, corporate headquarters assistance, and development of the Management Information System. Administrative activities include accounting, contracts/procurement, property management, rentals, office supplies, liability insurance and recruitment fees.

Engineering/geological support provides needed expertise in petroleum geology, reservoir engineering, drilling and production engineering, and design and construction engineering. The geology staff was increased by the new contractor/operator in FY 1982 with the addition of a senior geologist and two well-site geologists to monitor drilling operations, maintain reservoir descriptions, and plan reservoir development.

The Management Information System provides for the integration of all financial, accounting and reporting requirements for the Government and the contractor/operator. This includes the acquisition of a small main-frame computer, development of ADP software, maintenance and labor.

The increase in the FY 1984 request is due to major emphasis on general management, financial control, administration and technical management, additional operator personnel and implementation of the Management Information System.

c) Maintenance and Production Systems $ 2,965 $ 2,965 $ 3,639

This activity provides funding for the maintenance and repair of the following facilities and equipment necessary for the production, gathering and distribution of petroleum and related products:

- Operation, repair, and maintenance of petroleum handling facilities including treating, storage, pumping, flowline, gathering, sales and testing facilities. In addition to major repair work, this includes daily inspection of facilities, continuous preventive maintenance, and supplies and materials.
- Operation and maintenance of the Low Temperature Separation plant (LTS), gas injection wells, gas gathering and compression systems, gas distribution and sales system, and vapor system.
- Maintenance and repair of all waterflood facilities including the water well, processing and pumping facilities, water distribution facilities, filtering, water injection wells, remedial work and related supplies and materials.
- Maintenance, repair and fuel for all DOE owned heavy field equipment. This includes two vacuum trucks, a hot oil truck, two winch trucks, backhoe, forklift, grader, dozer, welding truck and a paint truck.
- Rental of GSA motorpool vehicles assigned to NPR-3.
- Electrical consumption necessary to operate field facilities and equipment.

The requested increase for FY 1984 is due to additional maintenance and filtering requirements on the waterflood systems and increased costs of labor, materials and services.

d) Buildings/Utilities/Roads 750 750 750

This activity provides for the maintenance and repair of all buildings, storage areas, utility systems, roads and grounds; including snow removal, fences, bridges, revegetation, field clean-up, trash disposal and oil spill containment. The requested level funding reflects the permanent improvements made to the field roads in the past three years and the reduced maintenance and repair requirements.

e) Chemical Program 350 350 380

This activity provides funding for the continuation of the chemical treatment program. This program covers produced oil treatment, waterflood bacteria control, scale and corrosion inhibition and paraffin control. Since implementation of the chemical program, down wells have averaged 7 wells, as opposed to 40 to 80 down wells prior to implementation of this activity.

f) Security 145 145 348

This item provides for property control and 24-hour per day security coverage. The requested increase is due to improved security to prevent the theft of oil and oil field equipment and materials. The additions include a full-time field security supervisor, a 24-hour random roving guard, a 24-hour south gate guard and communications eqiupment. The perimeter has been fenced and will require additional maintenance. Remote sensors have been placed at two locked gates.

g) Well Servicing 1,850 1,850 2,420

This activity provides for the routine servicing and maintenance of all producing wells at NPR-3. This includes the replacement of tubing, sucker rods, and bottom-hole pumps; maintenance and repair of surface equipment and pumping units;

and minor well stimulations and clean-outs. This activity also provides for approximately 100 bottom-hole pressure tests to monitor reservoir pressures. The requested increase is due to the higher number of wells that will require servicing.

h) Workover Rig $ 140 $ 140 $ 160

This item provides funding for the operation, maintenance and repair of the DOE owned work-over rig used to service and maintain producing wells. The requested increase is due to increased labor costs and slightly higher maintenance and operations costs due to increased utilization.

i) Fire Protection/Safety/First Aid 85 85 100

This item provides funding for the purchase, inspection and maintenance of fire protection, safety and first aid equipment, and for the training of contractor employees. The increase is due to the increased costs of services and materials and the utilization of a full-time field safety supervisor.

j) Operator Fee 880 880 2,337

This item provides funding for the operator fee portion of the cost-plus-award-fee contract. Under this contract, the operator receives a fixed base fee and an award fee which is calculated each quarter based on performance. The fee pool is based on a negotiated percentage of the total estimated annual contract cost. The requested increase is due to greater activity at the field.

Development Program.............................. 5,750 5,750 9,818

The FY 1984 budget request for the Development Program is $9,818,000. This is an increase of $4,068,000 over the FY 1983 request and is due to LTS plant modifications, drilling 25 additional wells, and increased costs of labor, material and services. These increases are necessary to continue development of NPR-3 to maintain the maximum efficient rate of production and to ensure optimum utilization of budgeted funds. Funding is requested for the following activities:

a) Wall Creek Wells 4,845 4,845 3,550

This request provides for the drilling of 14 Wall Creek Wells. Two wells will be drilled to the First Wall Creek in order to determine its productivity. Eight wells will be drilled to infill the Second Wall Creek and 4 wells will be drilled to the Third Wall Creek. The average cost per well drilled is estimated to be $254,000. Completion of these wells is expected to increase production by approximately 250 BOPD, with estimated annual revenues of $3,100,000.

b) Shale Wells -0- -0- 2,000

This item provides funding for the drilling and completion of 10 Shale wells. Shale wells are drilled on a random basis because of the fractures from which the oil is produced. Geological data indicate 10 locations with production potential. The increase in production is expected to be approximately 150 BOPD, with estimated annual revenues of $1,850,000.

c) Tensleep Wells 500 500 1,000

This request provides funding for the drilling of 2 Tensleep step out wells. The first 2 wells drilled to the Tensleep and completed in the "A" zone have each produced 100 BOPD. The 2 wells planned for FY 1984 will step out from the known productive area. It is estimated that the wells will produce about 200 BOPD, with estimated annual revenues of $2,500,000.

d) Shallow Shale Wells $ -0- $ -0- $ 300

This request provides funding for drilling 20 Shallow Shale Wells during FY 1984. The existence of oil in the shallow shale (200 feet) was discovered while drilling anode beds for a cathodic production system. These 20 wells will be used to determine the extent and productivity of the shallow shales in the area surrounding the 3 discovery wells.

e) Flowline Connections 200 200 360

This item provides funding for the installation of flowline connections, and installation of additional manifold valves to connect the newly drilled wells into the oil collection and treating system. The increase for FY 1984 provides for the connection of 46 wells, and is due to additional wells, longer flowlines, and inflation.

f) Electrical Connections 55 55 280

This item provides the necessary electrical hook-up for the 46 wells planned for FY 1984. The requested increase is due to longer electrical runs for the wells which will be farther from the existing distribution system, some capacity increases, and inflation.

g) Gas Plant Modifications -0- -0- 1,560

The gas compression and processing plant is presently limited to 8 MMCFPD. By adding an additional compressor, a parallel chiller, a de-ethanizer, overhead condenser and a second low pressure gas gathering system, the plant capacity can be increased to 10 MMCFPD. The additional capacity means that approximately 100 more barrels of oil per day could be produced along with an additional 1,300 gallons of propane and 2,500 gallons of butane. The modifications will pay out in slightly under one year, with estimated annual revenues of $1,700,000.

h) Field Improvements -0- -0- 400

This request provides funding for new shelters for the produced water transfer pumps and replacement of some of the 25 year old flowlines for Shannon production. The shelters over the pumps will replace temporary structures and will provide protection against cold temperatures during winter. The old flowline system is experiencing leaks and requires continual maintenance.

i) Reservoir Studies -0- -0- 200

This request provides the funding to perform an enhanced oil recovery screening study on the Muddy reservoir. Primary production from the Muddy is expected to be completed in FY 1984. This study will consider all types of enhanced recovery including waterflooding.

j) Equipment Purchase 150 150 168

This category provides funding for the purchase of needed field equipment and the replacement of old, inefficient heavy equipment. Items scheduled for purchase in FY 1984 are a bucket truck, a light plant and an auger truck. Also, a backhoe is planned to be replaced.

Enhanced Oil Recovery Program...................... $ 1,500 $ 1,500 $ 17,600

The FY 1984 budget request for EOR is $17,600,000. This significant increase in the budget request from previous years reflects the transition of the enhanced oil recovery program from pilot testing to operational implementation in the Shannon Zone.

a) Facilities $ -0- $ -0- $ 12,500

This request provides funding for the initial development of the expanded EOR program. This will provide for the drilling of injection and production wells and surface facilities expansion over a total of 80 acres.

b) Operations and Maintenance 1,500 1,500 3,100

This request provides funding to continue operation and maintenance of the two pilot EOR projects pending implementation of an expanded EOR program. This involves operations and maintenance of injection and production wells, and production, testing, and injection facilities. An additional $1,200,000 of carryover funding will be used to supplement the FY 1983 budget request to a funding level of $2,700,000 to operate and maintain both pilot projects for a full year. The actual requested increase for this activity, therefore, is $400,000, reflecting increased costs of operation and maintenance.

c) Reservoir Analysis -0- -0- 2,000

This item provides for needed expertise in implementing an expanded EOR program. Services provided will consist of reservoir predictions; analysis and evaluation of the pilots; conceptual design parameters for production, injection, and data gathering equipment. FY 1983 expenditures of $1,000,000 will be funded by the utilization of FY 1982 carryover funds. The requested increase is due to scale-up and design requirements involved for the EOR expansion.

Naval Oil Shale Reserves............................	$ 90	$ 90	$ 100

The goal of the Naval Oil Shale Reserves (NOSR) is to prepare, explore and develop the energy resources of these Reserves consistent with national defense requirements. The Pre-Development Plan for NOSRs 1 and 3 in Colorado was completed in FY 1982. The FY 1983 program consists only of continued land management and limited environmental monitoring activities to be conducted under interagency agreements with the Bureau of Land Management and the U.S. Geological Survey.

The FY 1984 budget request for the Naval Oil Shale Reserves is $100,000 an increase of $10,000 over FY 1983 in order to maintain the same level of effort.

Program Direction.................................. $ 5,138 $ 5,138 $ 5,421

This category provides the necessary funds to support 120 full-time equivalents (FTE's) for Program Direction in the following areas:

a) NPR-1 3,357 3,357 3,013

This request provides funding for salaries, benefits, travel, training and miscellaneous contractual services to support 77 FTE's located at Elk Hills, California. These FTE's provide for overall operation and management of the field, and include staffing for management, administration, financial management, contract administration and petroleum, construction and drilling engineering.

b) NPR-3 644 644 710

This request provides funding for salaries, benefits, travel, training and miscellaneous contract services to support 17 FTE's located at Casper, Wyoming. This includes staffing for management, finance and administration, petroleum and oil shale engineering, contract surveillance including procurement and property management, and geology. Miscellaneous contractual services includes rent, utilities, PCS moves, printing, materials and supplies.

c) Headquarters 1,137 1,137 1,698

This request provides funding for salaries, benefits, travel and training for 26 FTE's located in Washington, D.C. Headquarters provides for overall management and direction of the Reserves. This includes engineering oversight, environmental and safety compliance, policy and program planning, financial management, contract administration and administrative support. The increase requested is due principally to reimbursement for military pay, as it is envisioned that an additional five military positions will be filled by FY 1984.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Naval Petroleum and Oil Shale Reserves

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Reserves 1 & 2 (California)	Perform operation, maintenance and repair activities on production facilities, distribution systems, collection systems, storage facilities, gas processing plants, etc., necessary to continue MER production.	Perform operation, maintenance and repair activities on production facilities, distribution systems, collection systems, storage facilities, gas processing plants, etc., necessary to continue MER production.
	Complete 167 major remedial jobs.	Complete 180 major remedial jobs.
	Install financial and accounting enhancements to Financial and Management Information System.	Install engineering and production enhancements to Financial and Management Information System.
	Provide for facilities construction necessary to continue production and to meet changing field requirements.	Provide for facilities construction necessary to continue production and to meet changing field requirements.
	Drill 85 development wells.	Drill 98 development wells.
	Drill three exploration wells.	Drill five exploration wells.
	Produce approximately 151,000 BOPD.	Produce approximately 141,000 BOPD.
	Produce for sale approximately 124,500 MCF/D of natural gas.	Produce for sale approximately 127,800 MCF/D of natural gas.
	Produce for sale approximately 511,000 G/D of liquid products.	Produce for sale approximately 515,000 G/D of liquid products.
	Generate estimated gross revenues of $1.6 billion, including WPT of $284 million.	Generate estimated gross revenues of $1.5 billion, including WPT of $256 million.

KEY ACTIVITY SUMMARY (Continued)

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
Naval Petroleum and Oil Shale Reserves

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Reserve 3 (Wyoming)	Perform operation, maintenance and activities on production, collection, gas plant distribution facilities, etc. necessary to continue MER production.	Perform operation, maintenance and repair activities on production, collection, gas plant, distribution facilities, etc. necessary to continue MER production.
	Drill 21 development wells.	Drill 46 development wells.
	Operate, maintain, gather data and begin evaluation of EOR pilot projects.	Complete operation and evaluation of EOR pilot projects.
	Begin preliminary planning and design for expanded EOR application.	Initiate development of expanded EOR program including production and injection wells, facility requirements, and reservoir analyses.
	Begin installation of integrated Management Information System.	Complete integrated Management Information System.
	Produce approximately 2,950 BOPD.	Produce approximately 2,650 BOPD.
	Produce for sale 2,000 MCF/D of natural gas and 16,500 G/D of liquid products.	Produce for sale 2,000 MCF/D of natural gas and 16,500 G/D of liquid products.
	Generate estimated gross revenues of $39 million, including WPT of $8 million.	Generate estimated gross revenues of $36 million, including WPT of $7 million.
Naval Oil Shale Reserves	Continue land management and limited environmental monitoring activities.	Continue land management and limited environmental monitoring activities.
Headquarters	Perform management, financial, administrative, engineering, environmental, planning and procurement activities.	Perform management, financial, administrative, engineering, environmental, planning and procurement activities.
	Begin management Information System.	Complete Management Information System.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

FY 1984 CONTRACT LISTING
Naval Petroleum and Oil Shale Reserves
(In thousands of dollars.)

	Estimated Amount
NPR-1 & 2	
Unit Operator	$ 214,946
NPR-3	
Contractor/Operator	44,801
Motor pool services	212
Electric utility services	620
Subtotal	$ 45,633
NOSR	
Land Management	35
Environmental monitoring	65
Subtotal	$ 100
TOTAL NPOSR	$ 260,679

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Environmental Protection, Safety, and Emergency Preparedness

Naval Petroleum and Oil Shale Reserves
Naval Petroleum Reserves Nos. 1 & 2

(Tabular dollars in thousands. Narrative material in whole dollars.)

Development Facilities Total Estimated Cost (TEC) $8,458,000

Development Facilities

Total Estimated Cost (TEC) $8,458,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1984 Estimate		Total Project
	Obs.	B/A	B/O	B/A
Operating Expenses:				
Design and construction	$ ---	$ 8,458	$ 7,487	$ 8,458
Direct project related support costs	---	---	---	---
Total operating expenses	---	8,458	7,487	8,458
Other DOE Funding:	---	---	---	---
Total DOE Funding:	---	8,458	7,487	8,458
Non-DOE Funding:				
Design and construction	---	---	---	---
Total Project Funding	$ ---	$ 8,458	$ 7,487	$ 8,458

Development Facilities

Total Estimated Cost (TEC) $8,458,000

(Narrative material in whole dollars.)

Description, Objective, Justification

These are a number of small projects identified to meet the facilities requirements of an operational oil field. These small requirements in the past were considered as part of the California Development Program and represented a large portion of the increases in the Total Estimated Cost of that program. The California Development Program is fully funded and construction will be completed in FY 1983. Beginning in FY 1983, these continuing facilities requirements will be funded under the Development Facilities category.

Funding for the following requirements is being requested:

A) STEVENS ZONE FACILITIES $4,134,000

1) Electrical Power to Stevens Zone Pumping Wells: $ 248,000

20 wells/yr x $12,375/well = $247,500

Recent evaluations of pumping shale wells with high volume submersible pumps confirmed the necessity of producing large amounts of water from the wells in order to recover the oil at a reasonable rate. Submersible pumps proved to be superior to other types of high volume pumps. Electric power is required for these pumps.

If high volume pumps are utilized, the following increased revenues are expected:

FY 1984 Average Increase: 1,752 BOPD x 365 D/yr x $29/BO = $18,544,920

2) Replace use of natural gas with Compressed Air for Operating Instruments at Stevens Automated Condensate Collection Traps and Tank Settings: $ 2,452,000

67,200' of 4" pipe with valves, fittings, connections and supports.	$ 713,000
143,167' of 2" pipe with valves, fittings connections and supports.	$ 924,000

Interconnecting lines, fittings and instrumentation at 45 tank settings.	$ 115,000
4-250 HP air compressors with dehydration.	$ 700,000
	$ 2,452,000

Instrumentation and pneumatic control valves at the above installation discharge about 474,500 MCF of gas per year into the atmosphere. Estimated value of the gas at $4/MCF, including value of recoverable liquids, amounts to $1,898,000 a year. The instrument air system will save the gas and result in additional savings of about $330,000 a year from increased efficiency that will prevent venting of gas due to instrumentation and control valve failures.

Payout of the instrument air facilities at a cost of $2,737,000 and an operations and maintenance cost of $436,000 a year is estimated at 1.4 years.

3) Additional Stevens Tank Setting: $ 1,010,000

New tank setting with tanks, vapor recovery compressors, transfer pumps, well testing facilities, drain/cleanout tanks, and lateral pipelines, complete and installed at $1,010,000.

The additional tank setting will be required for step-out drilling of Stevens wells.

4) Convert Stevens Gas Injection Compressors: $ 424,000

FY 1984: 1100 HP x $385/HP = $423,500

A decision was made to reduce pressure maintenance by gas injection in the Stevens Zone for increased production performance. This has resulted in lower gas compression being required and more wells unable to produce into the high pressure (HP) production collection system than originally estimated, due to the reduced reservoir pressure. To obtain production from these low pressure (LP) wells, it will be necessary to produce them into the low pressure system. This additional gas production will require additional compression for processing the gas through the gas plant and for sales. Converting surplus gas injection compressors to low pressure and sales service is required.

Without the above coversions, the following revenue loss can be expected, based on value of gas at $4/MCF including contained extractable liquids and oil at $29/bbl:

FY 1984: 1,825,000 MCF + 912,500 B/O = $33,762,500

B) CARNEROS ZONE FACILITIES $3,156,000

Modify Existing Carneros Condensate Production Collection Facilities:

2-500 barrel tanks, transfer pumps, vapor recovery, drain/cleanout tanks, complete and installed.	$ 900,000
4-100 HP compressors.	$ 2,256,000
	$ 3,156,000

The Carneros wells currently produce into a high pressure collection system that transports gas and condensate from the western portion of the field to the 35R gas plants. Reservoir pressure will decline which will preclude producing into the high pressure system; it will then be necessary to install the above facilities to produce the Carneros Zone. If the above LP facilities are not provided, the following revenue loss can be expected based on value of gas at $4/MCF including contained extractable liquids and condensate valued at $29/bbl:

7,300,000 MCF + 73,000 B/O = $31,317,000

C) CONNECT 2B AND 24Z POOLS TO EXISTING WATERFLOOD SYSTEM $197,000

Currently, these pools are decreasing in production and efficiency due to a drop in pressure. In order to increase production efficiency, it is necessary to inject water for pressure maintenance. This will be done by connecting the 2B and 24Z pools to the existing waterflood systems which were completed during FY 1982. The funding requested provides for the necessary flowlines and connections.

DOE/MA-0064/1
VOLUME 7 OF 7

CONGRESSIONAL BUDGET REQUEST

FY 1984

VOLUME 7

ENERGY CONSERVATION
STRATEGIC PETROLEUM RESERVE
EMERGENCY PREPAREDNESS AND ENERGY REGULATION
ENERGY INFORMATION ADMINISTRATION

JANUARY 1983
U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY,
MANAGEMENT AND ADMINISTRATION
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before The Energy and Water Development Subcommittees:						
Energy Supply Research and Development	2,375,767	2,621,413	2,242,692	2,388,562	2,094,645	2,251,619
Uranium Enrichment	-80,679	-636,435	-26,183	-26,183	—	40,000
General Science and Research	495,094	476,299	542,548	554,313	645,250	633,550
Atomic Energy Defense Activities ..	4,904,577	4,477,696	5,703,700	5,474,735	6,778,075	6,422,180
Departmental Administration	184,609	172,979	222,074	177,706	141,872	141,872
Alaska Power Administration	3,538	3,720	3,945	3,090	3,210	3,210
Bonneville Power Administration ...	275,570	56,393	455,000	50,900	324,500	-60,500
Southeastern Power Administration .	7,287	3,852	3,964	7,090	20,594	19,566
Southwestern Power Administration .	12,269	22,667	20,756	36,690	36,229	36,229
Western Area Power Administration .	210,774	112,511	149,750	216,463	219,630	186,500
Western Area Power Emergency Fund .	500	71	337	337	500	500
Colorado River Basin Power Marketing Fund	—	-3,331	—	-5,000	—	-5,000
Federal Energy Regulatory Commission	84,563	88,303	86,139	87,316	34,582	33,200
Nuclear Waste Disposal Fund	—	—	217,325	179,481	306,675	277,271
Geothermal Resources Development Fund	2,200	1,789	—	2,200	2,100	2,100
Special Foreign Currency	—	312	—	—	—	—
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1982 Actual		FY 1983 Estimate		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development	417,737	652,459	217,514	450,000	94,000	277,000
Naval Petroleum and Oil Shale Reserves	213,142	259,001	222,000	257,110	266,100	268,171
Energy Conservation	143,070	525,869	279,290	658,785	74,377	320,000
Emergency Preparedness and Energy Regulation	62,277	67,529	38,106	53,860	22,591	25,148
Strategic Petroleum Reserve	3,875,432	3,877,351	2,316,178	2,054,457	741,870	2,094,000
Energy Information Activities	70,533	66,784	50,400	53,440	50,800	51,200
Alternative Fuels Production	---	39,213	---	23,491	---	---
Subtotal	4,782,191	5,488,286	3,123,488	3,551,143	1,249,738	3,035,519
Less Off-Budget SPR	-3,684,000	-3,686,651	-2,074,060	-1,770,600	-583,100	-1,866,400
Subtotal, Interior and Related Agencies Subcommittees	1,098,191	1,801,635	1,049,428	1,780,543	666,638	1,169,119
Subtotal, Energy and Water Development Subcommittees	8,476,069	7,398,239	9,622,047	9,147,700	10,607,862	9,982,297
Subtotal, Department of Energy	9,574,260	9,199,874	10,671,475	10,928,243	11,274,500	11,151,416
Permanent - Indefinite Appropriations:						
Payments to States	1,039	385	544	1,045	570	544
Total, Department of Energy	9,575,299	9,200,259	10,672,019	10,929,288	11,275,070	11,151,960

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I	1	1	1
EXECUTIVE LEVEL II	1	1	1
EXECUTIVE LEVEL III	2	2	2
EXECUTIVE LEVEL IV	19	15	16
EXECUTIVE LEVEL V	1	1	1
SUBTOTAL	24	20	21
ES-6	20	17	17
ES-5	73	60	59
ES-4	231	207	207
ES-3	105	88	87
ES-2	79	79	74
ES-1	73	67	67
SUBTOTAL	581	518	511
GS-18	1	1	1
GS-17	4	4	4
GS-16	26	25	24
GS/GM-15	1357	1210	1159
GS/GM-14	1802	1618	1540
GS/GM-13	2272	2147	2051
GS-12	1959	1818	1822
GS-11	1285	1232	1250
GS-10	84	72	75
GS-9	1063	905	902
GS-8	370	327	324
GS-7	1208	1105	1110
GS-6	1010	927	919
GS-5	999	1013	1006
GS-4	467	499	466
GS-3	154	152	128
GS-2	13	10	8
GS-1	3	3	2
SUBTOTAL	14,077	13,068	12,791
UNGRADED	1711	1627	1619
TOTAL PERMANENT POSITIONS	16,393	15,233	14,942
UNFILLED POSITIONS, END OF YEAR	122		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	16,271	15,233	14,942

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Energy Conservation

[(Including Transfer of Funds)]

For necessary expenses in carrying out energy conservation activities, [$279,290,000 and $64,000,000 to be derived by transfer from "Fossil energy construction", Department of Energy], $74,377,000, to remain available until expended: Provided, That the indebtedness guaranteed or committed to be guaranteed under section 10 of the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976, as amended (15 U.S.C. 2509), shall not exceed the aggregate of [$16,000,000: Provided further, That the funds for low-income weatherization activities appropriated under this Act shall be expended according to the regulations pertaining to the maximum allowable expenditures per dwelling unit which were in effect on October 1, 1982, and to the regulations pertaining to priority in providing weatherization assistance which were in effect on October 1, 1982: Provided further, That $34,400,000 shall be transferred to the Administrator, National Aeronautics and Space Administration for program management of the advanced automobile propulsion systems development program and the heavy duty transport program established in Public Law 95-238] $5,425,000: Provided further, That during fiscal year 1984, no new commitments to guarantee loans shall be made under section 10 of the Act.

Explanation of Change

Proposed FY 1984 appropriation language deletes provisions contained in the appropriation act for the Department of the Interior and Related Agencies, 1983 which relate to activities for which no funding is being requested in FY 1984. Also deletes language providing for a one-time transfer of funds to the National Aeronautics and Space Administration.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

ENERGY CONSERVATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5	2	2	
ES-4	3	1	
ES-3	5	3	2
ES-2	1	2	1
ES-1	1	1	1
SUBTOTAL	12	9	4
GS-18			
GS-17			
GS-16			
GS/GM-15	35	30	22
GS/GM-14	39	33	19
GS/GM-13	61	54	18
GS-12	54	46	6
GS-11	40	36	7
GS-10			
GS-9	16	16	6
GS-8	4		4
GS-7	19	18	12
GS-6	22	21	14
GS-5	10	9	8
GS-4	2	3	3
GS-3		3	
GS-2			
GS-1			
SUBTOTAL	302	269	119
UNGRADED			
TOTAL PERMANENT POSITIONS	314	278	123
UNFILLED POSITIONS, END OF YEAR			
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	314	278	123

FY 1983 CONGRESSIONAL BUDGET
AMOUNTS AVAILABLE FOR OBLIGATION
ENERGY CONSERVATION
(dollars in thousands)

	FY 1983	FY 1984
Appropriation	$279,290	$74,377
Comparative transfer to:	0	0
Comparative transfer from:	0	0
Subtotal, Budget Authority	$279,290	$74,377
Unobligated balances, Start of year	71,278	0
Unobligated balances, transferred from other accounts	64,000	0
Unobligated balances, End of year	0	0
Total, obligations	$414,568	$74,377

D) CATHODIC PRODUCTION $571,000

Cathodic Protection for New Wells:

FY 1984: 100 wells x $5,710/well = $571,000

Subsurface geologic formations and fluids are highly corrosive to the external surface of well casing. Cathodic protection is required to prevent casing corrosion. If casing is not protected, the casing will deteriorate resulting in exorbitant cost of repairing the casing and, in some cases, loss of wells. Providing the above cathodic protection will result in the continuation of the cathodic protection program which began in 1960.

E) ENHANCED OIL RECOVERY $400,000

Steam Injection Facilities:

Steam injection facilities include a 50 MMBTU steam generator, steam piping, valves, insulation, and related surface equipment for steam drive operations.

EOR pilot projects in the Tulare and Shallow Oil Zones, to be initiated in FY 1984, are expected to provide the data needed for expanded future EOR operations. These initial technical pilots, as well as pilot projects scheduled for FY 1985, will require two to three years for construction, operation, and evaluation before final design and construction begins on the expanded projects. EOR is expected to significantly increase recoverable reserves.

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
ENERGY AND WATER DEVELOPMENT SUBCOM:						
HEADQUARTERS	4,962	5,243	4,526	4,853	4,392	4,577
FIELD	8,906	9,500	8,789	9,374	8,800	9,369
SUBTOTAL	13,868	14,743	13,315	14,227	13,192	13,946
INTERIOR SUBCOMMITTEE:						
HEADQUARTERS	1,475	1,554	1,194	1,261	1,014	1,058
FIELD	1,536	1,648	1,122	1,194	752	794
SUBTOTAL	3,011	3,202	2,316	2,455	1,766	1,852
TOTAL DEPARTMENT OF ENERGY:						
HEADQUARTERS	6,437	6,797	5,720	6,114	5,406	5,635
FIELD	10,442	11,148	9,911	10,568	9,552	10,163
TOTAL FY84 REQUEST	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY
FY 1984 BUDGET STAFFING DISTRIBUTION

	FY 1982 ACTUAL FTP	FY 1982 ACTUAL TOTAL	FY 1983 FTP	FY 1983 TOTAL	FY 1984 FTP	FY 1984 TOTAL
DOE APPROPRIATION SUMMARY:						
10XXXX ENERGY SUPPLY R & D	1,199	1,270	1,030	1,109	914	968
ESRD HEADQUARTERS	844	881	716	776	594	629
ESRD FIELD	355	389	314	333	320	339
15XXXX URANIUM ENRICHMENT	119	126	67	67	69	69
UE HEADQUARTERS	59	60	56	56	58	58
UE FIELD	60	66	11	11	11	11
20XXXX GENERAL SCIENCE & RESEARCH	29	30	30	32	33	35
25XXXX ATOMIC ENERGY DEF ACTIVITIES	2,441	2,520	2,491	2,585	2,609	2,705
AEDA HEADQUARTERS	423	439	453	473	484	504
AEDA FIELD	2,018	2,081	2,038	2,112	2,125	2,201
30XXXX DEPARTMENTAL ADMINISTRATION	3,644	3,939	3,206	3,567	2,768	2,982
DA HEADQUARTERS	2,082	2,236	1,619	1,821	1,445	1,525
DA FIELD	1,562	1,703	1,587	1,746	1,323	1,457
34XXXX ALASKA PA	36	43	32	36	34	38
36XXXX BONNEVILLE PA	3,413	3,637	3,313	3,542	3,425	3,651
38XXXX SOUTHEASTERN PA	37	38	38	39	40	41
42XXXX SOUTHWESTERN PA	157	189	166	190	160	192
WESTERN AREA PA	1,266	1,352	1,274	1,349	1,338	1,423
46XXXX WAPA POWER MARKETING	1,058	1,132	1,066	1,129	1,128	1,201
50XXXX WAPA COLORADO RIVER BASIN	208	220	208	220	210	222
52XXXX FED ENERGY REGULATORY COMM	1,522	1,594	1,636	1,678	1,701	1,742
54XXXX NUCLEAR WASTE DISPOSAL FUND			28	29	89	96
NWDF HEADQUARTERS			14	15	75	82
NWDF FIELD			14	14	14	14
56XXXX GEOTHERMAL RESOURCES DEV FUND	3	3	2	2	2	2
65XXXX FOSSIL ENERGY R & D	1,058	1,140	738	790	561	591
FERD HEADQUARTERS	229	234	131	135	125	130
FERD FIELD	829	906	607	655	436	461
70XXXX NAVAL PETROL & OIL SHALE RES	98	105	117	117	120	120
NPOSR HEADQUARTERS	23	23	25	25	26	26
NPOSR FIELD	75	82	92	92	94	94
75XXXX ENERGY CONSERVATION	313	329	273	280	123	128
EC HEADQUARTERS	216	227	168	175	73	78
EC FIELD	97	102	105	105	50	50
80XXXX EMERG PREP & ENERGY REG	849	886	562	591	326	333
EPER HEADQUARTERS	459	492	393	415	306	313
EPER FIELD	390	394	169	176	20	20
85XXXX STRATEGIC PETROL RESERVE	178	199	176	197	179	200
SPR HEADQUARTERS	52	55	43	47	44	48
SPR FIELD	126	144	133	150	135	152
90XXXX ENERGY INFO ACTIVITIES	515	543	450	480	457	480
EIA HEADQUARTERS	496	523	434	464	440	463
EIA FIELD	19	20	16	16	17	17
94XXXX ADVANCES FOR COOP WORK	2	2	2	2	2	2
TOTAL DOE APPROPRIATIONS	16,879	17,945	15,631	16,682	14,958	15,798
LESS DIFFERENCE						
OMB ALLOWANCE/GUIDANCE	16,879	17,945	15,631	16,682	14,958	15,798

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY CONSERVATION

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Buildings and Community Systems	47,665	39,100	16,385
Industrial	28,848	27,900	10,633
Transportation	58,944	53,900	40,957
Multi-Sector	16,473	12,730	3,102
State and Local	231,910	233,660	3,300
Energy Impact Assistance	—	—	—
Subtotal, Energy Conservation	383,840	367,290	74,377
General Reduction	—	-24,000	—
FY 81 Deferrals	-240,770	-64,000	—
Total, Energy Conservation	143,070	279,290	74,377

FY 1984 Congressional Budget
MAJOR ACTIVITY OVERVIEW

Energy Conservation

The aims of the Energy Conservation Program are to conduct basic research in fields of scientific inquiry where new knowledge can expand the generic technology base underlying energy conservation. This will allow the private sector to develop ways to make more efficient use of available energy and to facilitate use of nonpetroleum sources in buildings, industry and transportation.

With implementation of petroleum price decontrol, market price increases and expectations of further increases in energy costs will accelerate the marketplace applications of economical energy-saving technologies, as well as the development and demonstrations of previously unproven technologies. The President's economic recovery program, which includes lower taxes, tax credits for R&D, and removal of unnecessary regulatory burdens, will improve the efficiency of the operation of the market for energy. Thus, recognizing that each sector of our Nation's economy has very strong financial incentives to develop and demonstrate technologies that appear technically and economically promising, the Federal conservation research program has focused its efforts away from demonstration and toward expanding our scientific knowledge base by supporting fundamental research activities.

The program will conduct research activities that address technical unknowns associated with promising energy efficient technologies that are to risky and long term for the private sector to conduct alone. The Energy Conservation Program produces technical information and design tools that offer a potential benefit to U.S. industry. This research is planned and executed with a high degree of interaction with the private sector groups that will ultimately use the results of the research. In this way, relevance and rapid transfer of the results are assured.

In FY 1984, the Energy Conservation Program will carry out its activities through 4 programs:

- o Buildings & Community Systems
- o Industrial Programs
- o Transportation
- o Energy Conversion and Utilization Technology within Multi-Sector

Activities in each end use program focus on generic research topics having high potential for improving energy-use efficiency.

State & Local Programs

During FY 1984, close out activities will be conducted for State and Local Programs funded in prior years.

Department of Energy
FY 1984 Congressional Budget Request
Lead Table
Energy Conservation
(Tabular dollars in thousands)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Buildings and Community Systems				
Operating Expenses	47,230	39,100	39,100	16,385
Capital equipment	435	0	0	0
Subtotal	47,665	39,100	39,100	16,385
Industrial				
Operating expenses	28,848	27,900	27,900	10,633
Capital equipment	0	0	0	0
Subtotal	28,848	27,900	27,900	10,633
Transportation				
Operating expenses	58,704	53,900	53,900	31,957
Capital equipment	240	0	0	0
Plant	0	0	0	9,000
Subtotal	58,944	53,900	53,900	40,957
State and Local				
Operating expenses	231,910	233,660	233,660	3,300
Subtotal	231,910	233,660	233,660	3,300
Multi-Sector				
Operating expenses	16,089	12,730	12,730	3,102
Capital equipment	384	0	0	0
Subtotal	16,473	12,730	12,730	3,102
Energy Impact Assistance	0	-24,000	-24,000	0
Transfer of Prior Year Deferrals	240,770	-64,000	-64,000	0
Total				
Operating expenses	142,011	279,290	279,290	65,377
Capital equipment	1,059	0	0	0
Plant	0	0	0	9,000
Energy Conservation	143,070	279,290	279,290	74,377
Staffing: FTP/FTE	313/329	273/280 2/	273/280	123/128 1/

1/ Includes 65 FTE's for State and Local and 63 FTE's for Conservation R & D.

2/ The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Energy Conservation
Buildings and Community Systems
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1983 Base	FY 1984 Base
Buildings & Community Systems				
Building Systems	$ 18,622	$ 13,400	$13,400	$ 6,600
Residential Conservation Service	3,360	3,400	3,400	-0-
Community Systems	3,840	3,700	3,700	-0-
Urban Waste	4,800	3,000	3,000	-0-
Small Business	-0-	-0-	-0-	-0-
Technology & Consumer Products	10,560	10,600	10,600	5,250
Appliance Standards	1,632	1,000	1,000	1,700
Analysis & Technology Transfer	960	1,000	1,000	200
Federal Energy Management Program	480	500	500	1,000
Program Direction	2,976	2,500	2,500	1,635
Capital Equipment	435	-0-	-0-	-0-
Total	$ 47,665	$ 39,100	$39,100	$16,385
Staffing FTP/FTE	70/74	52/55*	52/55	33/34

* The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements for personnel levels.

Authorization:
Pub. L. 94-438, Energy Reorgaization Act of 1974
Pub. L. 93-577, as amended, Energy Research and Development Act
Pub. L. 95-619 (Sec. 224, Parts 1, 2, 4: Sec. 210-223; and Sec. 501, 541-551), National Energy Conservation Policy Act
Pub. L. 94-385, Energy Conservation and Production Act
Pub. L. 95-618, (Title I), Energy Tax Act
Pub. L. 163, Part E (Sec. 381), Energy Policy and Conservation Act
Pub. L. 294, Energy Security Act
Pub. L. 620, Power Plant and Industrial Fuel Use Act of 1978
Pub. L. 96-702, Emergency Energy Conservation Act of 1979

Summary of Changes

FY 1983 Appropriations Enacted	$	39,100
Program Increases and Decreases:		
Building Systems: Reduce R&D activities in building envelopes, ventilation, and systems analysis and eliminate BEPS regulatory programs.	-	6,800
Residential Conservation Service	-	3,400
Community Systems	-	3,000
Urban Waste: Integrated into Biomass program.	-	3,700
Technology and Consumer Products: Reduced effort in heat pump, lighting, and combustion equipment research	-	5,350
Appliance Standards: Expedite, update, and improve predictive capability of test procedures.	+	700
Analysis and Technology Transfer: Restrict to technology transfer through IEA agreements.	-	800
Federal Energy Management Program: Expedite validation studies, workshops, and revisions and printing of manuals.	+	500
Program Direction: Reduce staffing.	-	865
FY 1984 Budget Request	$	16,385

Department of Energy
FY 1984 Congressional Budget Request
Narrative Justification
Buildings and Community Systems

The goal of the Buildings and Community Systems (BCS) program is to increase the energy efficiency of the building sector by carrying out research on technologies with application to building systems and building equipment. This goal is being achieved through a comprehensive R&D program emphasizing long-term, generic research and the transfer of this research to the private sector.

Accomplishments during FY 1982 and expected accomplishments in FY 1983 include the following:

- Completed construction at the National Bureau of Standards of a calibrated hot box and used it to measure the dynamic thermal transmission characteristics of large wall and roof specimens.

- Developed at the Lawrence Berkeley Laboratory a mobile window thermal test facility to obtain measurements of fenestration performance at many geographic sites.

- Developed proposed modifications to ASHRAE Standard 90 for commercial buildings and guidelines for residential buildings and mobile homes. Six years of research results were captured and used in the supporting systems analysis of new and existing small office buildings.

- Provided new information on energy in design to more than 100,000 architects and engineers, chiefly through support of institutes for architectural and engineering faculties.

- Validated energy audit accuracy with measured field data and developed procedures for predicting the interactive effects of conservation measures.

- Adapted, tested and evaluated the RCS audit as a Home Energy Rating System (HERS) procedure. Modified the system for use in a cooling climate and for new homes.

- Evaluated the field performance of integrated gas space heating/domestic hot water systems.

- Evaluated metallic and nonmetallic materials for condensing heat exchangers in combustion heating equipment and assessed alternative fuels for residential and commercial heating.

- Completed development of proof-of-concept model of an internal combustion, engine-driven heat compressor and of a free-piston, Stirling engine-driven/hydraulically coupled compressor for heat pumps.

- Analyzed a new concept for high-efficiency absorption cycles, constructed a model for new fluid pairs for single-effect systems, released a second-generation heat pump design model to industry, and initiated development of a high efficiency absorption heat pump using existing fluid pairs.

- Compiled data on material combinations to provide improved insulation for appliances.
- Constructed an experimental gas-isotope lamp, identified efficacy-improving lamp-gas isotope mixtures, and developed a laboratory-scale isotope separation process prototype.
- Amended appliance energy efficiency test procedures, processed test procedure waivers, proposed rules regarding energy efficiency standards for appliances, and processed State petitions for waiver under the Federal standards program.
- Completed final designs for four grid-connected Integrated Community Energy Systems (ICES) and initiated construction of three others.
- Published a District Heating and Cooling Handbook, a Community Energy Auditing Guidebook, and a developers' guidebook to energy-efficient design.
- Completed the Federal 10-Year Buildings Plan, reviewed and critiqued operating plan for Federal agencies, reviewed and approved agency building plans, conducted life-cycle cost and "Energy in Design" workshops, reported to Congress on agencies progress in meeting energy conservation goals, and developed a pilot project for third-party financing of energy management service in Federal Buildings.
- Revised and simplified the RCS regulations, reviewed the implementation plans of States and utilities, and formalized regulations governing the Commercial and Apartment Conservation Service (CACS) program.
- Completed and validated an advanced predictive model for fenestration, sunlight control, and daylighting analysis and expanded the controls predictor computer program to include daylighting control strategies.
- Added the capability to simulate evaporative coolers, electrical generation, heat exchangers, powered induction units, and improved simulation of windows and daylighting to DOE-2.

Funding requested for the Buildings and Community Systems program in FY 1984 will be used to support long-range, generic research and the transfer of research data to the private sector. Program areas in which these activities will be carried out are Building Systems, Technology and Consumer Products, Appliance Standards, the Federal Energy Management Program, and Analysis and Technology Transfer. Each is discussed below.

Building Systems	$6,600,000

Funding requested for the Building Systems subprogram in FY 1984 is for research and development relating to building envelope systems and materials, research utilization, residential audit techniques, and the Home Energy Rating System.

In the area of building envelope systems and materials, funding of $1,400,000 is requested for wall and roof systems research. These funds will be used to continue cooperative field and laboratory investigations of roof performance and to initiate construction of a roof test apparatus for measuring dynamic thermal and moisture transfer effects in roof systems. A model for predicting thermal mass effects will be developed and validated and a handbook, and guidelines on dynamic and steady-state performance of wall subsystems will be developed. Data from the thermal mass test cells located at the National Bureau of Standards (NBS) in Maryland and at Tesuque Pueblo, New Mexico, will be analyzed and incorporated into a thermal mass design handbook. Test procedures will be developed for performing dynamic heat transfer and air leakage measurements on composite wall sections in the calibrated hot box facility at NBS. Procedures for measuring moisture retention and transmission phenomena in wall constructions will be developed and validated.

Funding of $1,200,000 is requested for windows and daylighting research. These funds will be used to continue the development and validation of methods to predict, measure, and evaluate the energy performance characteristics of advanced fenestration systems and to provide results of this research in forms usable by practicing architects, designers, and engineers. The requested funding for insulation materials research is $1,500,000. It will be used for studies to enhance understanding of the thermal performance, fire safety aspects, moisture transfer and corrosion effects of existing and new building envelope insulation materials. Improved procedures will be developed for testing insulation smoldering combustion, metal corrosion due to insulation, and vapor retardant membrane properties.

The $1,000,000 requested for research utilization activities will be used to continue to make the results of building energy systems research available to all practitioners in the building industry. This work will be accomplished in close collaboration with the existing building industry infrastructure, professional societies, educational institutions, and other government agencies at all levels. Institutes for architectural and engineering faculties will be continued, plans for disseminating research results will be established, and a system to identify sources of building energy data and make that data available to the building industry will be developed.

The funding requested for research in the area of residential audit techniques is $1,000,000. It will be used to develop lower-cost methods for determining the effectiveness of energy conservation measures in new and existing residential buildings and to validate improved audit methodologies. The request for Home Energy Rating Systems (HERS) activities is $500,000. It will be used to develop and disseminate materials for training in the use of the HERS concept.

Technology and Consumer Products	$5,250,000

The funding requested for the Technology and Consumer Products subprogram will support research projects initiated in prior fiscal years in three program areas: lighting technology, heat pumps and refrigeration systems, and combustion heating equipment.

Funding of $1,000,000 is requested for lighting research to be conducted in FY 1984. This research consists of two basic sub-elements: long-range research to improve the efficiency of light sources, and lighting systems integration to effectively utilize lighting system energy. Two strategies are being pursued to improve the efficiency of gas discharge lamps. One strategy is to analyze magnetic (Zeeman) effects on lamps, which are expected to reduce entrapment of ultraviolet radiation impinging on the phosphor coating and thus increase efficiency. Another strategy is to analyze the effects of varying the frequency of operation of lamps and consequently to identify factors that convert electricity to light, enabling optimization of that energy-conversion phenomenon. The initial strategy being pursued to effectively utilize systems energy is to investigate the interaction of lighting systems with HVAC and envelope systems to advance the understanding of the impact of lighting systems on whole building energy performance.

The objective of the heat pump and refrigeration research subprogram is to assist the private sector in developing high-efficiency advanced absorption heat pumps with a coefficient of performance of 1.5 or better. The strategy used to achieve this goal is to investigate advanced absorption fluid pairs and materials compatability and to develop a computer model for designing and understanding advanced absorption systems. Funding of $2,750,000 is requested for this program area in FY 1984. Research and proof-of-concept testing of a high-efficiency absorption heat pump will be initiated and design techniques to reduce heat exchanger losses from frosting/defrosting will be implemented. Multiphase heat-transfer phenomena and design concepts for condensing heat exchanger applications will be analyzed. To achieve a better understanding of the heat transport phenomenon in soil in various geographical areas, analysis and subsystem experiments will be undertaken to understand moisture migration and effects on heat transfer due to soil freezing and drying out. Analysis will be performed to characterize suitable materials for ground-coupled heat exchangers for various soil conditions. In the development of advanced insulation for appliances, the heat transfer process for various material combinations will be characterized. A data base will be developed to evaluate the technical performance and economics of different insulation systems.

The combustion heating equipment subprogram is pursuing research and development of thermal energy conversion technology utilizing gas, oil and solid fuels. The goal of this program area is to assist the private sector in developing the necessary technology which can lead to improvements in utilization efficiencies of equipment in building heating systems. The requested funding for combusion heating equipment research in FY 1984 is $1,500,000. Technical areas of research include the nature of combustion processes for gas, oil, wood and coal; characterizing the organic products from wood combustion and the properties of combusted wood; identifying heat-transfer phenomena including radiant effects; heat exchangers materials for condensing heating systems; and equipment control and utilization strategies that can lead to energy conservation in space heating.

Appliance Standards $1,700,000

A total of $1,700,000 is requested for the Appliance Standards program in FY 1984 to continue activities required under the Energy Policy and Conservation Act (EPCA) as amended. FY 1984 funds will be used primarily to keep test procedures current. Test procedures form the basis for representations regarding the energy consumption or the cost of energy consumed as required under the Federal Trade Commission's (FTC) Appliance Labeling program. In conjunction with the efforts to keep test procedures current, DOE may temporarily waive requirements that produce unreliable or unrepresentative results for particular appliances. In addition, development and simplification of test procedures will continue in FY 1984.

In conjunction with the FTC labeling program, EPCA requires a consumer education effort to heighten public awareness of labeling information. In FY 1984, DOE will work with the FTC to facilitate achievement of this goal regarding the efficiency and cost-of-operation data.

Although the energy-efficiency standards for appliances that are expected to be established in FY 1983 will preempt State standards, procedures have been established whereby States can petition DOE for exemption from preemption. During FY 1984, it will be necessary for DOE to process these State petitions.

Federal Energy Management Program	$1,000,000

The reduction in Federal enegy usage since 1975 and the resulting cost avoidance reflect Federal agencies' concerted efforts to improve energy efficiency in response to market forces. The Federal Energy Management Program (FEMP) coordinates energy conservation efficiency activities throughout the Federal government. The requested FY 1984 funding will support (1) Federal planning for achievement of energy conservation and efficiency goals and objectives; (2) program technical guidance such as establishing a single life-cycle cost (LCC) methodology for Federal agencies; workshops for LCC, "Energy in Design," employee awareness, and updating and printing "how to" manuals; and (3) monitoring and reporting program progress, cost, and energy savings to the President and Congress.

Analysis and Technology Transfer	$200,000

The funding requested will be used for technology transfer through support of IEA implementing agreements. BCS research results, along with the information on foreign building R&D and technologies resulting from the IEA agreements, will be transferred to the U.S. private sector. This will allow the U.S. private sector to benefit from already completed R&D and avoid investing in duplicative and nonbeneficial research activities.

Program Direction	$1,635,000

The requested funding will provide staffing at a level of 34 FTE'S. This includes funding for salaries, benefits, and travel to manage the Buildings and Community Systems program.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
BUILDING SYSTEMS		
Wall and Roof Systems	Complete roof study, analysis, and model development; validate model; initiate cooperative field/lab composite roof test investigation. Design roof test apparatus.	Develop and validate procedures for establishing dynamic thermal and moisture transfer effects on roof systems. ($.2M)
	Modify test cells and complete testing and analysis. Initiate development of mass effect predictive model.	Develop a thermal mass prediction model and handbook. ($.5M)
	Continue dynamic testing, including thermal effects of air and moisture movement, of full-scale walls in the NBS and PCA calibrated hot boxes. Complete round robin tests and develop basis for calibrated box consensus standard. Complete lab tests of Envelope Thermal Testing Unit and initiate field testing. Continue laboratory and field testing and analysis of moisture migration and condensation in systems.	Develop test procedures for combined dynamic heat transmission and air leakage in composite wall sections, and develop a concept for handbook of performance data. ($.5M)
		Develop and validate procedures for establishing moisture presence, migration, and thermal effects on building envelope systems. ($.2M)

Department of Energy
FY 1983 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Windows and Daylighting	Continue analysis of commercial building net annual performance of windows with multi-glazing materials, films coatings, and shading devices. Establish effect on building energy load management.	Develop computational models and experimental procedures for advanced window concepts. ($.4M)
	Continue development and validation of predictive models for analysis of variable filtering devices and of geometrically complex fenestration, sun control systems, and spaces. Develop improved modeling capabilities for convective and infiltrative window heat transfer. Continue daylighting availability data collection and data base development, adding Florida and New Mexico data. Compile and format data for design use.	Develop and test techniques for determining, comparing, and optimizing net energy flow in fenestration components. ($.6M) Develop and validate procedures for establishing thermal and daylighting properties of innovative glazing materials. ($.2M)

Department of Energy
FY 1983 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Insulation Materials	Develop smoldering ignition test for cellulose insulation. Complete development of corrosion test for insulation.	Perform laboratory measurements of thermal and moisture permeability, properties of envelope materials. ($.8M)
	Complete development of analytical thermal insulation heat transfer model. Initiate examination of dynmaic thermal properties of all types of insulation. Continue to expand technical data base for thermal and mechanical properties of insulating materials.	Develop test procedures for reflective insulation, and pipe and duct insulation. ($.4M)
		Develop thermal energy transport factors for dynamic heat flows in envelope insulation materials. ($.1M)
		Perform laboratory and field tests of fire ignition, permanency of fire retardants, and corrosion effects of retardants for envelope insulation materials. ($.2M)
Research Utilization	Continue, in cooperation with ACSA, the institute for architectural faculty; continue, in cooperation with ACEC, institute for engineering faculty; revise curricula to include latest research; continue student design competition; develop Sweet's Catalog insert on FY 82 research; convene national panel to define research and delivery mechanisms; develop research, design tools and performance data base.	Continue, in cooperation with ACSA, institute for architectural faculty; continue, in cooperation with ACEC, institute for engineering faculty; continue student design competition, develop Sweet's Catalog insert on FY 83 research; initiate recommendations of national panel; upgrade and promulgate critical research and performance data; develop two simplified

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Research Utilization (cont'd)		design tools from whole building systems analysis research activity. ($1.0M)
Analytical Methods Validate Residential Audit Techniques		Research on more effective and less costly audit and retrofit techniques for existing homes, and audit and retrofit techniques for multi-family and small commercial buildings. ($.5M)
		Develop and validate model audits capable of predicting performance of a combination of measures for multi-family and small commercial buildings. ($.3M)
		Validate theoretical models and audit methodology in order to develop tools for measuring energy use in buildings. ($.2M)
Home Energy Rating Systems (HERS) Evaluation and Implementation		Develop HERS training materials and disseminate to industry users. Investigate and validate HERS in a cooling climate and on new homes. Evaluate the HERS program. ($.5M)

Department of Energy
FY 1983 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
TECHNOLOGY AND CONSUMER PRODUCTS		
Thermally Activated Heat Pumps	Initiate R&D for second-generation, high-efficiency, heat pumps. Develop analytical tools for design analysis and optimization of advanced absorption systems.	Continue R&D for second-generation, high-efficiency, heat pumps. Improve analytical tools for optimization of advanced absorption fluid pairs and material compatability. ($1.9M)
Refrigeration Systems (Ground-Coupled Heat Exchangers)	Initiate research on soil heat-transfer properties for ground-coupled heat pumps. Characterize soil properties and moisture migration for various soil types and geographic locations.	Develop necessary understanding of energy transport processes in ground due to moisture migration and heat transfer for various soil and weather conditions. ($.6M)
Appliance Technology (Advanced Insulation)	Compile data on thermophysical properties and heat transfer characteristics of combinations of materials for development of advanced insulation systems.	Develop and test advanced insulation concepts for various sizes, shapes, and applications. ($.3M)
Lamp Technology	Study additional light sources for high-frequency operation and investigate effect on system components.	Analyze operating frequency ranges of gas-discharge lamps to determine optimum high-frequency operation. ($.4M)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Lamp Technology (cont'd)	Perform experiments to validate the theoretical predictions of the magnetic (Zeeman-Stark) effect on gas discharge lamps.	Analyze magnetic (Zeeman-Stark effect) on discharge lamps to increase efficiency of energy transfer to phosphor coating. ($.3M)
Lighting Systems Integration	Evaluate design efficiency improvements and analyze fundamental relationships between lighting system components.	Investigate interaction lighting systems with HVAC and envelope systems by field evaluation of experimental designs. ($.3M)
Combustion Heating Equipment (Condensing Heat Exchangers)	Complete experimental verification of heat transfer analysis for condensing heat exchangers; assess fabrication technology for new material systems for condensing heat exchanger applications.	Perform heat transfer correlation analysis and characterize design concepts; develop design optimization methodology for condensing-mode heating equipment. ($.2M)
	Initiate heat transfer correlation and optimization methodology development for condensing heating systems.	Develop condensing heat exchanger fabrication technology processing techniques using new materials. ($.2M)
	Develop combustion technology for low/variable-capacity, low-sooting burners.	Perform accelerated long-life testing of selected new, low-cost materials systems under corrosive gas condensates. ($.3M)
Wood and Coal Combustion Heating Systems	Investigate wood combustion mechanism: initiate characterization of organic products from burning wood and properties of combusted wood.	Investigate basic solid-fuel combustion combustion mechanism: complete characterization of organic products from burning wood and

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Wood & Coal Combustion Heating Systems (cont'd)		properties of combusted wood; initiate wood combustion model development, and improve efficiency of wood, coal and processed solid-fuel-fired equipment. ($.3M)
Distributed Radiant Heating Technology	Assess energy conversation potential of distributed heating concepts on radiant energy heating systems, subspace utilization, and human perception of comfort.	Perform laboratory and field experiments to develop data on the characteristics and performance of radiant heating and human response factors. ($.5M)
APPLIANCE STANDARDS Appliance Labeling	Continue to develop, maintain, simplify, and improve test procedures in support of the FTC labeling program. Process manufacturer requests for test procedure waiver.	Continue to develop, maintain, simplify, and improve test procedures for appliances in support of the FTC labeling program. ($1.0M)
	Conduct research in support of appliances for standards and complete rulemakings for 12 appliance types. Process State requests not to be preempted by Federal standards.	Process manufacturer requests for modification of appliance test procedures to include indidual models for which existing test procedures do not apply. ($.6M)
		Perform research in conjunction with FTC and others to assure maximum use of efficiency and cost-of-operation data. ($.1M)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Building and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
FEDERAL ENERGY MANAGEMENT PROGRAM Federal Energy Planning	Continue work on Federal buildings plans. Initiate development of contractual framework for 3rd party financing of retrofit. Draft guidelines for Agencies energy emergency contingency plans. Revise Buildings and Operations guidelines.	Revise and update Federal buildings plans. Continue work on energy emergency contingency plan for the Federal agencies. Review and approve changes to agencies buildings and operations plans. ($.1M)
Federal Energy Reporting	Prepare annual reports to the President and to the Congress on status of agencie's plans and performance in retrofitting of buildings and operations of vehicles and equipment.	Prepare annual reports to the President and to the Congress cn status of agencie's plans and performance on retrofitting of buildings and operations of vehicles and equipment. ($.1M)
FEMP Program Performance	Review updates to agencies buildings and operations plans. Monitor agencies performance.	Monitor agencies performance. Review energy conservation projects at operational sites. ($.3M)
FEMP Program Technical Guidance	Develop guidance and procedures for using marginal costing in the selection of retrofit projects. Update life-cycle-cost (LCC) manual and conduct LCC workshops. Conduct "Energy in Design" workshops for Federal architects and engineers.	Update life-cycle-cost factors and provide changes to manual. Evaluate the use of marginal costs in selecting retrofit projects. Update and print "How to" manuals. Continue workshops and seminars for (1) life-cycle-costs, (2) "Energy in Design" and (3) employee awareness. ($.5M)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Buildings and Community Systems

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
ANALYSIS AND TECHNOLOGY TRANSFER		
Support to IEA Working Party on End-Use Technologies	Provide assistance to (a) support IEA Implementing Agreements; (b) transfer infiltration measurement techniques to member countries; (c) continue collaborating efforts on new window design, minimum ventilation requirements, and control systems simulation.	Provide assistance to support IEA Implementing Agreements and transfer results of IEA research to the U.S. private sector. ($.2M)
PROGRAM DIRECTION		
Program Direction	Staffing at the level of 62 FTE's. Salaries, benefits, and travel to manage BCS programs.	Staffing at the level of 34 FTE's. Salaries, benefits, and travel to manage BCS programs. ($1.635M)

Department of Energy
FY 1984 Congressional Budget Request

Energy Conservation
Industrial Energy Conservation
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1982 Appr.	FY 1983 Appr.	FY 1984 Base	FY 1984 Request
INDUSTRIAL ENERGY CONSERVATION				
Waste Energy Reduction	$11,904	$12,000	$12,000	$ 7,300
Process Efficiency	7,680	7,700	7,700	2,400
Implementation & Deployment . .	2,304	1,700	1,700	200
Cogeneration	4,800	5,000	5,000	-0-
Program Direction	2,160	1,500	1,500	733
Capital Equipment	-0-	-0-	-0-	-0-
Total	$28,848	$27,900	$27,900	$10,633
Staffing: FTP/FTE	44/46	32/33 *	32/33	15/16

AUTHORIZATION: P.L. 93-572, "Federal Non-Nuclear Energy Research and Development Act of 1974"
P.L. 95-619, "National Energy Conservation Policy Act"
P.L. 94-163, "Energy Policy and Conservation Act"
P.L. 93-438, "Energy Reorganization Act"
P.L. 95-91, "Department of Energy Reorganization Act"

Summary of Changes

FY 1983 Appropriations Enacted	$27,900
Program Increases and Decreases:	
Project Milestone Completions	-17,917
One Time Analyses and Studies	- 2,325
Projects Entering More Costly Phases	+ 3,300
Projects Entering Less Costly Phases	- 325
FY 1984 Budget Request	$10,633

* The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative requirements for employment. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements for personnel levels.

Department of Energy
FY 1984 Congressional Budget Request

Industrial Energy Conservation

The Industrial Energy Conservation Program seeks to increase energy use efficiency and to promote the substitution of alternative fuels for conventional fuels in the industrial sector via a program of carefully targeted technology research and development activities. The program is focused on high risk development which private industry has insufficient incentive to pursue independently. Most of the activities are conducted by industrial companies or other private institutions operating under cost-shared contracts or cooperative agreements with the Department.

Program Accomplishments

FY 1983 program accomplishments include the following:

- Completed development phases for first U.S. low-speed diesel cogeneration system at a pharmaceutical plant in New Jersey.
- Tested pilot-scale hot inspection system, using infra-red to detect defects in hot ingots (avoiding cool down and reheat sequence), in a major steel mill.
- Completed testing in lab-scale unit of chemical-based separation of oxygen.
- Completed plant trials for membrane-based oxygen enrichment system, for enriched combustion air.
- Tested non-consumable ceramic/metallic anode in pilot unit, replacing anodes of petroleum coke.
- Developed high-efficiency welder, now in production by the private sector.
- Tested advanced cupola furnace with no after burner, fully meeting environmental requirements.
- Conducted 240 audits in medium and small firms through energy analysis and diagnostic centers at five universities.
- Initiated R&D in chemical, gas cycle and magnetic heat pumps; dry-coating systems, membrane separation systems, thin-strip casting, comminution, advanced concentration processes, advanced farm equipment and sensors, and amorphous metal fabrication.

Waste Energy Reduction $7,300,000

During FY 1984, research and development activities will continue for improving combustion efficiency of industrial furnaces and boilers. These activities cover basic combustion studies for a design of a variable geometry burner for heavy liquid fuels including coal mixtures. Included is the definition of combustion parameters and study of ultraviolet emission of combustion species for improved flame efficiency and burner control techniques. Another area of evaluation is oxygen enriched combustion. This research and development is exploring the use of membranes for air separation to provide higher concentrations of combustion air for increased flame temperatures and less loss in heated nitrogen carry-through. Membranes, membrane formation, and configurations will be tested in the laboratory to determine flux levels, formation problems, overall efficiency of separation, and potential economics of the technology.

High temperature heat exchanger activity will continue into FY 1984 utilizing the materials and fabrication techniques developed in prior years. Engineering prototype hardware will be constructed according to specially developed designs and placed on high temperature test in dirty exhaust gas environments. Testing results will be evaluated for effectiveness of operation, fouling, etc. If appropriate, the equipment may be removed for laboratory autopsy.

Work will be continued on high temperature industrial heat pumps. Based on prior years' efforts of component development, including working fluids, these elements will be utilized in the development of an optimum cycle configuration. A complete design of such a system will be initiated and will be followed by the fabrication and testing of an engineering prototype system.

Another major research and development effort to be continued into FY 1984 is the utilization of industrial waste materials as feedstocks, fuels, or other usable materials. Industrial wastewaters are a large potential energy resource. Laboratory testing will be continued on selected wastestreams to determine optimum techniques for recovery or conversion (anaerobic digestion, advance biological conversion, etc.) and the effectiveness of these techniques. Research and development activity will be continued in the more efficient use of solid wastes. Efforts will continue on the removal of moisture from wet wood wastes by mechanical compression and the development and testing of a large volume combustor utilizing low energy content gases from waste gasifiers.

Industrial Process Efficiency $2,400,000

Cost-shared research and development activity will continue on various technologies which will, if successful, substantially reduce the amount of energy required for achieving separations of materials. The work to be accomplished will affect a number of industries. During FY 1984, separations research activity will be directed toward continuation of work on the freeze crystallization and membrane technologies. Freeze crystallization, which has significant potential applications in the food and paper industries, holds the promise of substantially reducing the requirements for energy-intensive evaporation systems to accomplish removal of water from solutions.

In FY 1984, new membrane systems for use in such applications as separations of gases and ethanol-water separations, recovery of inorganic chemicals, separations of gases and removal of dissolved color bodies, will be designed, tested and evaluated, as well as combinations of advanced membrane separation technologies. The most promising materials will be selected for utilization in these systems.

FY 1984 funds for sensors (to improve the control of both high-temperature and low-temperature processes) will be applied to laboratory and pilot units for testing of advanced technologies such as acoustic emissions.

Implementation and Deployment . . . .$ 200,000

FY 1984 funds will provide for management of the industrial reporting program and development of the Annual Report to the Congress and the President on industrial energy efficiency improvement.

Program Direction . . . .$ 733,000

Funding requested will provide for 15 full time staff positions and one part time position to manage new and ongoing projects.

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request

Waste Energy Reduction
(Dollars Are In Thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Improved Combustion Efficiency Objective: To increase overall efficiency of combustion through increased flame temperature ture, decreased excess air, and higher combustion air preheat.	Conduct parametric testing of oxygen-enriched combustion. Initiate development of technique for producing high flux levels using new membrane configurations and thicknesses. Conduct laboratory testing of effectiveness of membrane fabrication techniques and configurations.	Continue development of membrane fabrication techniques, substrate support, and laboratory testing of effectiveness. Finalize development of membrane elements and configurations. Obtain test results of laboratory operation including flux levels achieved, cost of operation, energy savings, overall economics of the technology. ($800)
		Improve current design of a variable geometry burner for heavy liq. fuels to include coal mixtures. Define combustion parameters (droplet, evap. rate, swirl) for control of flame character (length, radiative transfer, etc.). Study UV emission of combustion species and correlate to flame efficiency and control techniques. ($1,100)
Advanced High Temperature Recuperators Objective: To assist the private sector in developing high effectiveness heat exchangers that operate in various environments and can be produced at relatively low cost.	Continue heat exchanger materials testing, evaluate fabrication techniques, and conceptual development of passage configurations for large passage ceramic recuperators. Conduct design studies on these configurations and initiate fabrication of novel configurations. Continue cost reduction activities to identify low cost material and fabrication techniques.	Fabricate engineering model hardware for high temperature testing of large passage recuperator in dirty gas environment. ($1,000)

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request

Waste Energy Reduction(Cont'd)
(Dollars Are In Thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Advanced High Temperature Industrial Heat Pumps Objective: To upgrade waste heat to process steam.	Continue laboratory testing of lab chemical heat pump. Investigate alternative cycles, working fluids, and materials to achieve higher steam temperatures (400-500°F). Modify test unit with new components and working fluids and conduct performance testing.	Continue laboratory development of working fluids, components, and performance testing for chemical heat pumps. Develop optimum cycle configuration. Build and test prototype system. ($2,400)
Industrial Waste Material Utilization Objective: To assist the private sector in developing technologies which utilize industrial waste materials (liquids, gases) as feedstock fuels or other usable forms.	Optimize biological film growth among anaerobic reactor types. Develop processes to reclaim metals from finishing wastewaters. Conduct a workshop with industry to identify wastewater reclamation opportunities. Establish an industrial working group to monitor and support the wastewater utilization activities.	Continue development of anaerobic reactor systems. Validate selected anaerobic film growth configuration by pilot scale test. Continue research in biological conversion to specialty chemical feedstocks. Continue process development to reclaim metal from finishing wastewaters. ($1,200)
	Conduct laboratory studies on selected problematic chemical wastes. (alkali metals, toxic metals, polymeric residuals, phenolics). Characterize reaction conditions and product gases. Outline mini plant test facility requirements.	Complete laboratory studies on selected problematic chemical waste and operate a process development pilot unit. Continue effort on compression drying of woodwaste and development testing of combustor for low energy content from waste gasifier. ($800)

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request

Industrial Process Efficiency
(Dollars Are In Thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Separation System Technology Objective: To develop techniques for efficient solution separation/concentration applicable to a variety of industries.	Research on applications of indirect freeze concentration technology for application to food processing and concentration of black liquor solids. Test selected processes to establish concentration rates and energy requirements. Determine the basic feasibility of adopting hydrate freeze separation technology for the food industry. Initiate pilot plant studies in petro-chemical recoveries. Finalize construction of osmotic distillation, pervaporation and osmotic phase separation bench units.	Complete laboratory evaluation of indirect and hydrate freeze separation technology. Complete pilot scale testing of membrane and electro-osmotic pump separation systems for application to food, petrochemical and forest product process applications. ($1,400)

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request

Industrial Process Efficiency (Cont'd)
(Dollars Are In Thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Sensors and Controls Objective: To develop on line sensing devices to enable real time measurement of critical process parameters.	Collection of experimental spectral data for designs of sensor for combustion control process and a prototype steam flowmeter sensor to measure the mass flowrate and total steam temperature and pressure.	Complete testing of non-intrusive steam flowmeter. ($300)
	Pursuant to direct measurement of thermal state of solids, complete lab evaluation of acoustic emission technology for temperature measurement system. Evaluate eddy current technology as an alternate method.	Complete laboratory evaluation of acoustic transmission tomographic temperature gradient measurement system. ($200)
	Investigate alternative chemical analytical systems, which work rapidly and accurately upon immersion in a liquid steel bath. System must be simple to operate and durable in a hostile environment.	Continue exploratory development of chemical analytical system to perform on-site measurement in molten metal bath. ($500)

KEY ACTIVITY SUMMARY

Department of Energy
FY 1984 Congressional Budget Request

Implementation and Deployment
(Dollars Are In Thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Industrial Reporting Program Objective: Carry out legislative mandate, and establish basis for joing activities with industry to improve industrial energy productivity.	Continue receipt and analysis of reports on energy efficiency improvement and recovered materials, which are required to be submitted by industry annually.	Continue receipt and analysis of reports on energy efficiency improvement and recovered materials, which are required to be submitted by industry annually. ($200)

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Transportation
Energy Conservation - Operating Expenses
Energy Conservation - Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1985 Request
Transportation				
Vehicle propulsion R&D				
Operating expenses	$33,504	$35,000	$35,000	$16,100
Electric and hybrid vehicle R&D				
Operating expenses	18,816	13,900	13,900	9,500
Transportation systems utilization				
Operating expenses	960	0	0	500
Alternative fuels utilization				
Operating expenses	3,984	1,500	1,500	4,000
Capital equipment	240	0	0	0
Subtotal	4,224	1,500	1,500	4,000
Advanced materials development				
Operating expenses	0	2,000	2,000	1,500
Construction	0	0	0	9,000
Subtotal	0	2,000	2,000	10,500
Program direction				
Operating expenses	1,440	1,500	1,500	357
Total				
Operating expenses	58,704	53,900	53,900	31,957
Capital equipment	240	0	0	0
Construction	0	0	0	9,000
Total	$58,944	$53,900	$53,900	$40,957
Staffing				
FTP/FTE	40/42	24/25*	24/25	8/10

Authorization: P.L. 93-577, "Federal Non-nuclear Energy Research and Development Act of 1974"
P.L. 93-275, "Federal Energy Administration Act of 1974"
P.L. 93-438, "Energy Reorganization Act of 1974"
P.L. 94-163, "Energy Policy and Conservation Act"
P.L. 94-413, "Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976"
P.L. 95-91, "Department of Energy Organization Act"
P.L. 95-238, "Department of Energy Authorizations for FY 1978"
P.L. 96-512, "Methane Transportation Research, Development and Demonstration Act of 1980"

Summary of Changes

FY 1983 Appropriation enacted	$ 53,900
Program increases and decreases:	
Complete dynamometer characterization of MOD I Stirling engine	- 13,000
Converge AGT proof-of-concept to one engine development team	- 6,500
Reduce heavy duty transport materials and tribology R&D	- 900
Reduce testing and evaluation of ceramic and composite materials	- 500
Design and construct an advanced materials development laboratory	+ 9,000
Continue technology assessment and transfer	+ 1,500
Initiate dissociated methane engine research	+ 2,500
Complete hybrid vehicle research and development	- 2,000
Complete advanced electric vehicle technology assessments	- 1,800
Complete a.c. propulsion system development	- 1,700

Increase test and evaluation of electric and hybrid new technology	+ 1,100
Print and distribute Gas Mileage Guide	+ 500
Reduce staff levels	- 1,143
FY 1984 Budget Request	$ 40,957

Budget request: The transportation FY 1984 budget request for operating expenses and construction is $40,957,000. This amount is required to carry out the program's objective to perform research and development on vehicles and engines which will increase the fuel efficiency of the transportation system and allow a switch from petroleum to electricity and alternative fuels. The strategy to achieve this objective includes emphasis on technology development rather than product design, maximum involvement by U.S. industry in identification and solution of technology problems, and concentration on key technology barriers where high risks prohibit industry-only financing.

Major FY 1982 and anticipated FY 1983 program accomplishments include:

- Automotive gas turbine fully-bladed, ceramic rotors were cold spun in excess of design specifications during FY 1982.
- The heavy duty turbine test engine was run at design speed (37,000 rpm) and temperature (2070°F) with rotating and stationary ceramic parts in FY 1982.
- Automotive Stirling MOD I design engine was tested in FY 1982 and demonstrated a maximum efficiency of 37.4 percent, exceeding the goal of 36.7 percent.
- In excess of 2,000 engine hours of endurance testing will be accumulated on the MOD I Stirling engine and characterization of the USA-built MOD I engine will be completed by the end of FY 1983.
- In FY 1982 a prototype organic rankine compound diesel bottoming system for long-haul trucks showed a 12 percent fuel economy improvement.
- To increase the range of an electric vehicle, specific energy density of lead-acid batteries was increased to 41 Wh/kg, compared to 30 WH/kg in 1977 when the program began; for nickel-iron batteries, from 48 Wh/kg compared to 38 Wh/kg in 1977.
- By FY 1982, cycle life performance of lead-acid batteries was improved from 250 cycles in 1977 to 508 cycles, and from 100 cycles to 816 cycles for nickel-iron batteries.
- An integrated a.c. motor and transaxle for electric vehicle propulsion is being developed which will be 20 percent lighter and will occupy 35 percent less volume than the best a.c. propulsion system available today.
- The hybrid test vehicle, representing a 120 mpg on urban cycle, 5-passenger car with the first on/off heat engine blended with a battery in smooth operation, will be completed and delivered to Jet Propulsion Laboratory for test and evaluation in FY 1983.
- During FY 1982, nickel-iron batteries were tested and evaluated in seven vehicles running 80-mile missions in vehicle site operations.
- By the end of FY 1982, the technical data base (except for optimal efficiency), delineating practicable options to overcome deficiencies in using alcohol fuels in spark-ignition engines (except for wear, cold start and commercially acceptable fuel specifications) was established.

- A source of representation test fuels for synthetic crudes was established in FY 1982 leading to exploratory investigations to identify and understand problems associated with achieving fuel/engine tradeoffs for use of optimized synthetic fuels.
- Gas Mileage Guides for model years' 1982 and 1983 were printed and distributed.

Vehicle Propulsion R&D $16,100,000

The advanced automotive gas turbine (AGT) engine program has been supported under the Vehicle Propulsion R&D program since FY 1980 and has been implemented through two industry teams. The major technological barriers identified early in the program were in the areas of small component aerodynamic efficiencies and in the application of ceramic materials to high temperature structural components. In FY 1984, the proof-of-concept automotive gas turbine program will continue with one contractor focussing efforts on the development and evaluation of ceramic stationary and rotating components and the improvement of component aerodynamic performance. Engine and hot rig tests will be performed with first generation ceramic turbine rotors and improved ceramic static components. Continuing development will be performed on structural ceramic high-temperature, long-life, low-cost components with emphasis on fabrication techniques, materials processing, and materials property investigations. Technology assessments of highway transportation related industry, academic and Government R&D efforts will continue, as will efforts to effect program coordination with other Government agencies and technology transfer with industry.

In 1980, heavy trucks (26,000 lbs. gross vehicle weight) used about 90 percent of all highway diesel fuel. Between 1975 and 1980, heavy truck energy use increased from 14 percent to 17 percent of total highway energy use, and is expected to reach 20 percent by 1990. Initial evaluations of the benefits of uncooled, reduced friction, commercial heavy duty diesel engines with waste heat recovery indicate the potential for up to 90 percent gain in operational fuel economy. In FY 1984, the process of analysis to screen out the more promising approaches to high-temperature ceramic insulating materials, high-temperature tribology (friction, wear and lubrication), and toughened ceramics will be continued. The high-temperature tribology efforts will complement the characterization of the lubricity of base stock oils molecular fractions being conducted as part of the Energy Conversion and Utilization Technologies (ECUT) program. Initial comparisons will be made of techniques for waste heat recovery in light of appreciably higher exhaust temperatures. Systems modeling techniques will be developed to evaluate the potential of uncooled diesel engine technology coupled with appropriate waste heat concepts.

Electric and Hybrid Vehicle R&D .... $ 9,500,000

The objective of this effort is to conduct the research and development of the long-term, high-risk technologies that would assist industry in producing electric vehicles. One of the most important technologies to be developed is batteries specifically for electric vehicle application. The desirable attributes of an electric vehicle battery include: high power density for vehicle acceleration and hill climbing, increased energy density for greater range and improved cycle life for repeated deep discharging and recharging. In FY 1984, research on lead-acid battery technology will continue on the most promising concepts for reducing capacity loss and extending battery life. An advanced experimental nickel-iron, full-vehicle-size battery pack will be developed, including gas and electrolyte management systems previously developed at the module level. Research and development on advanced batteries (i.e., zinc-bromine and sodium-sulfur) will be continued towards technology compatible with a.c. propulsion systems for passenger car and van applications.

In the vehicle test site operations, vehicle technology deficiencis are being identified and characterized leading to research and development programs to resolve these deficiencies. In FY 1984, test and evaluation activities of new technology will include a thermally-controlled battery compartment to improve battery performance (by 20 to 25 percent) and extend battery life; a microprocessor battery monitoring system and battery watering systems; and new technology lead-acid, nickel-iron and zinc-chlorine batteries. The road and track testing of experimental vehicles will continue to identify and characterize technology deficiencies in an operational environment. The User Task Force of electric vehicle site operators will continue to be supported for resolving operational problem areas and proof-of-concept testing of new technologies.

Transportation Systems Utilization .... $ 500,000

Comparative fuel economy information on new cars and light trucks has been developed and disseminated to new car dealers by the Federal Government each year since authority was granted under the Energy Policy and Conservation Act of 1975 (P.L. 93-163). Economics achieved through modifications to the brochure format and printing process, along with adjustments in the number of copies printed to more effectively meet public needs, have resulted in reduced overall costs. In FY 1984, the number of copies printed and the distribution mode will be selected on the basis of prior year consumer demand.

Alternative Fuels Utilization .... $ 4,000,000

The Alternative Fuels Utilization program has the objective of achieving technical commercial readiness of various finished-fuel/engine combinations appropriate to extending and eventually replacing petroleum as fuel for mobile equipment, with emphasis on highway vehicles. In FY 1984, the exploratory investigation of fuels from synthetic crudes will continue with more meaningful results achieved due to availability of representative test fuels from synthetic crude. Data from use of selected reference samples in both Government-and industry-sponsored tests will be pooled to provide an expansive data reservoir. Test and evaluation of safety and operational related problems which remain as barriers to use of methane and other gaseous fuels will be conducted. Selected tests and evaluation will be conducted to delineate the optimum results which can be achieved in contemporary equipment by use of essentially straight methanol fuel in liquid, reformed and/or dissociated form.

Advanced Materials Development $10,500,000

The need for independent research on advanced materials has become evident as work progresses on the gas turbine and uncooled heavy duty diesel projects. Most advanced engine component designs require materials which can operate at higher temperatures and under more severe cyclic stress and corrosive environments than conventional engines. Although the engine programs are providing the required focus to prove the potential of ceramic components, a parallel basic technology effort is necessary for the development of reliable and reproducible ceramic parts. Current activities are directed towards research and development of monolithic and composite ceramic materials and in joining of ceramic to ceramic and ceramic to metal. Non-destructive evaluation techniques and improved processing techniques are being developed. In FY 1984, research will continue on monolithic and composite materials processing, focussed on obtaining fully-dense, near-zero-porosity materials in near-net shapes. Research on materials evaluation techniques will focus on time-temperature behavior, micro-structure analysis, non-destructuve evaluation of physical and mechanical properties, and thermal fatigue screening. The first phase of the construction of an advanced materials laboratory to support advanced materials development programs and activities will be initiated.

Program Direction .... $ 357,000

The budget request provides for 10 FTE to develop the overall strategies, plans and resource requirements, and provide the integrated program management necessary to conduct the research and development of the various transportation technologies described in the budget request.

*The FY 1983 and Fy 1984 employment estimates assume enactment of legislation to repeal the legislative employment requirements. Such legislation is being proposed with the Budget. In the interim, the Department plans to comply with legislative requirements regarding personnel levels.

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Transportation
Vehicle Propulsion R&D
(dollars in thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Automotive Gas Turbine	Continue proof-of-concept automotive gas turbine engine development with focus on advanced component development and material evaluation and two teams	Continue proof-of-concept automotive gas turbine engine development with one converged industry team and continue focus on advanced components development and material evaluation ($10.0M)
	Continue gas turbine supporting research and technology with major emphasis on ceramics	Continue research and technology in structural ceramic materials for gas turbine applications ($2.0M)
Heavy Duty Transport	Continue waste heat utilization technology research and development	Continue research on new concepts for high-temperature waste heat recovery ($1.0M)
	Continue advanced heavy duty diesel technology research and development	Continue research on high-temperature tribology for advanced diesel engines including ceramic friction/wear, dry film lubrication, and gas/foil bearings ($.8M)
	Continue supporting materials research and development with major emphasis on high-temperature insulating and bearing ceramics	Continue development of advanced high-temperature insulating materials including ceramic composites, ceramic matrix and metal fiber reinforced structures, transformation-toughened ceramics, and thermal barrier materials and coatings for adiabatic diesel application ($.8M)
Technology Assessment and Transfer	Continue vehicle propulsion technology assessments in industry and government; transfer technology developed within DOE to other government agencies and industry	Continue vehicle propulsion technology assessments in industry and government; transfer technology developed within DOE to other government agencies and industry ($1.5M)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Transportation
Electric and Hybrid Vehicle R&D
(dollars in thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Advanced Battery Research and Development	Conduct research and development of advanced battery technology compatible with a.c. propulsion system technology for passenger car and van application	Continue research and development of advanced battery technology compatible with a.c. propulsion system technology for passenger car and van application ($3.5M)
	Evaluate alternative lead-acid battery concepts for high power vehicle applications	Conduct research aimed at understanding capacity loss and integration of elements in lead-acid batteries ($.3M)
	Conduct research and development on improved nickel-iron battery modules and characterization of gas and electrolyte problem areas	Develop and test an advanced full experimental nickel-iron battery pack with gas and electrolyte management systems ($.9M)
	Conduct research and development for longer life lead-acid battery modules and characterization of temperature effects on performance	Develop a fully integrated lead-acid battery system technology, including thermal and electrolyte management systems ($.7M)
Test and Evaluation o Test Site	Identify and characterize vehicle technology deficiencies for research and development improvements	Continue identification and characterization of technology deficiencies (battery thermal performance), retrofit and test new technology components ($2.0M)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Transportation
Electric and Hybrid Vehicle R&D
(dollars in thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Test and Evaluation (continued)	Provide technical support to the User Task Force and initiate integration of improved component technologies in vehicles for test and evaluation	Continue resolution of operational problems with User Task Force and integrate new technologies (nickel-iron batteries, controllers) for proof-of-concept testing ($1.5M)
o Advanced Technology Testing	Develop, integrate and test battery microprocessor support system	Develop microprocessor battery monitoring system breadboard ($.6M)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Transportation
Transportation Systems Utilization
(dollars in thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
New Car Fuel Economy	Publish and distribute the 1984 model year Gas Mileage Guide	Publish and distribute the 1985 model year Gas Mileage Guide ($.5M)

Key Activity Summary
Transportation
Alternative Fuels Utilization
(dollars in thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Gasoline- and Diesel-like Synfuels; New Hydrocarbons	Continue synthetic fuels/engine optimization exploratory investigation	Continue synthetic fuels/engine optimization exploratory investigation ($.6M)
	Continue synthetic test fuels processing and characterization/performance analyses of processed fuels in cooperation with industry	Continue synthetic test fuels and utilization research and development in cooperation with industry to identify, understand and resolve problems ($.6M)
Alcohols		Establish whether liquid, reformed or dissociated methanol provides the most advantageous use of the related features of lean burn, high octane and waste heat recovery ($2.8)

Department of Energy
FY 1984 Congressional Budget Request
Key Activity Summary
Transportation
Advanced Materials Development
(dollars in thousands)

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Advanced Materials Development	Research and development on ceramic and composite materials; development of nondestructive testing and processing reliability	Continue materials processing research focussed on obtaining fully-dense, near-zero-porosity materials in near-net shapes ($.7M)
		Continue development of materials property evaluation including time-temperature behavior, micro-structure analysis, physical and mechanical properties, and thermal fatigue screening ($.8M)
		Design and begin to construct necessary facilities to support advanced materials development programs and activities ($9.0M)

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET SUBMISSION

CONSTRUCTION PROJECT DATA SHEETS

ENERGY CONSERVATION
VEHICLE AND ENGINE R&D

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High temperature materials laboratory. Site to be determined.

2. Project No. 84-CS-101

3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1985

4. Date construction ends: 3rd Qtr. FY 1988

5. Previous cost estimate: N/A
Date: N/A

6. Current cost estimate: $20,600
Date: 12/82

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1984	$20,600	$ 9,000	$9,000	$3,000
1985	0	11,600	9,000	7,500
1986	0	0	2,600	8,500
1987	0	0	0	1,000
1988	0	0	0	600

8. Brief Physical Description of Project

The proposed project will consist of a new multi-story building to be approximately 43,000 sq. ft. or greater. The building will house research laboratories, offices, and service areas, and the project will also include special equipment needed for high temperature materials research in the areas of mechanical behavior, physical property measurements, structual characterization, and materials synthesis and preparation.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High temperature materials laboratory
Site to be determined.

2. Project No. 84-CS-101

8. Brief Physical Description of Project (continued):

Laboratories will be provided for the research groupings to be housed in the building (Mechanical Behavior, Physical Properties, Structual Characterization, and Materials Synthesis and Preparation). The building will include a mechanical behavior laboratory, several standard size laboratories, and smaller laboratories for individual research activities.

Office space will be provided to accommodate requirements for both single and multiple occupancy. Service and support areas will include a loading dock and a penthouse for the ventilation system. A combination freight and passenger elevator will be located near the dock entrance to facilitate deliveries to the upper floor and the equipment penthouse, and as an aid to handicapped persons.

Improvements to the land will include the limited relocation of existing utilities and provisions for access, parking for government vehicles, and landscaping as required. Utilities will be extended from existing distribution systems. Planned long-term experiments, which may run continuously for a decade or longer, will be protected against power failure by emergency power from diesel motor-generator sets. Drainage from the facility will flow to the existing plant collection and treatment systems.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of the High Temperature Materials Laboratory (HTML) is to provide appropriate space and equipment to conduct long range and medium term research designed to provide an understanding and useful application of the relationships between a material's properties at elevated temperatures and its structure, composition, and environment. It is intended that the materials to be studied will be directly related to the high temperature materials needs for advanced energy systems and other applications as identified in concert with industrial needs but which are of such high risk that the HTML provides unique facilities for study of these material problems. The HTML will also provide the concentration of expertise to provide solutions for complex elevated temperature materials problems in fossil and advanced energy systems.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High temperature materials laboratory
Site to be determined.

2. Project No. 84-CS-101

9. Purpose, Justification of Need for, and Scope of Project (continued):

A. Need for High Temperature Materials Research

Materials limitations dominate virtually all advanced concepts for energy production and use. These limitations are most commonly associated with mechanical of chemical instability at elevated temperatures in more adverse environments. For example, component failures due to erosion and corrosion processes are the chief causes of shutdowns in synthetic fuel pilot plants and in chemical processing plant components such as reformers and crackers. Corrosive attack of the cathodes in high temperature batteries based on the Na-S cell limits the performance of such batteries, which might otherwise be used for electric vehicle propulsion and in electric energy storage systems. An understanding of elevated-temperature-materials behavior would affect the United States energy program in the following areas:

1. Higher operating temperatures of energy-producing systems, as governed by the Carnot cycle, would increase the efficiency of the conversion of heat energy.

2. The reliability of structural components in service at elevated temperatures would be improved.

3. The high temperature materials problems that limit the feasibility of some advanced systems would be solved.

4. The conservation of fuel and scarce materials would be achieved.

5. Broad exploratory research holds the potential for the discovery of new properties of known materials and for the development of new classes of materials. New physical phenomena may be discovered that might allow entirely new energy systems to be invented. Such long-term research holds the possibility of contributing to the energy needs of the United States in a revolutionawy way.

B. Need for a High Temperature Materials Laboratory

Neither private industry nor another Government agency is likely to fund the basic research needed to support energy systems materials needs. A comprehensive Department of Energy (DOE)-supported laboratory is the most efficient medium to long-range approach to the deficiencies that now exist. A DOE-dedicated laboratory, with its specialized equipment and personnel, would serve as an important national resource. Those factors favoring an HTML are listed below:

Department of Energy
FY 1984 CONGRESSIONAL BUDGET
LEAD TABLE
State and Local Assistance Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
State and Local				
EPCA Grants	$ 24,000	$ 24,000	$ 24,000	$ - 0 -
Schools & Hospitals	48,000	48,000	48,000	- 0 -
Weatherization	144,000	145,000	145,000	- 0 -
Energy Extension Service	9,600	10,000	10,000	- 0 -
Program Direction	6,310	6,660	6,660	3,300
Total	$231,910	$233,660	$233,660	$ 3,300
Staffing*: FTP/FTE	150/156	143/145	143/145	65/65

Authorizations: National Energy Extension Service Act, Title V, P.L. 95-39;
Energy Policy and Conservation Grant Program (Energy Policy and Conservation Act, P.L. 94-163);
Energy Conservation and Production Grant Program (Energy Conservation and Production Act, P.L. 95-385);
Schools and Hospitals Grant Program (National Energy Conservation Policy Act, Sec. 301-304, P.L. 95-619);
Other Local Government Buildings Grant Program (National Energy Conservation Policy Act, Sec. 310-312, P.L. 95-619);
Weatherization Assistance Program Energy Conservation and Production Act, Sec. 411, P.L. 94-385);
Department of Energy Organization Act, P.L. 95-91;
P.L. 93-577, The Federal Non-nuclear Energy Research and Development Act of 1974
P.L. 95-91, Section 301, Department of Energy Organization Act

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*The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the Budget. In the interim, the Department plans to comply with legislative requirements regarding personnel levels.

1. Title and location of project: High temperature materials laboratory
Site to be determined.
Project No. 84-CS-107

9. Purpose, Justification of Need for, and Scope of Project (continued):

1. An HTML, with its staff of professionals from several disciplines, would be capable of addressing broad multi-faceted or multi-disciplinary questions concerning high temperature materials research.

2. An HTML would serve as a DOE resource, housing equipment and expertise in the specialized area of high temperature materials synthesis.

3. An HTML would improve the resolution and detection of high temperature materials phenomena through the development of uniform procedures for preparing, analyzing, and testing materials.

4. An HTML would serve as a DOE resource capable of performing difficult property measurements at high temperatures.

5. An HTML would be able to attack the problem of predicting long-term (10 to 30 years) service behavior from short-term tests by housing the needed long-term experiments.

6. An HTML would provide a center for broad exploratory research on matter at high temperatures (2000 C), a regime that is relatively unexplored.

8. An HTML, encompassing both fundamental and applied research, would expedite the transfer of fundamental information and results to technology and would provide an ideal environment for technology transfer for materials research results to the industrial sector.

C. Criteria for a High Temperature Materials Laboratory

To meet the above specification, an HTML must meet the following criteria:

1. It must have a strong basic materials-science program in the areas of high temperature materials, and it must have strong links with the academic community.

2. It must have companion programs that extend from basic and applied research to engineering development related to the DOE missions.

3. It must work closely with industry to provide facilities and results that will further United States technology.

1. Title and location of project: High temperature materials laboratory.
Site to be determined.

2. Project No. 84-CS-101

9. Purpose, Justification of Need For, and Scope of Project (continued):

On the basis of applying these criteria to existing United States laboratories (industrial, nonprofit, and federal government) and university research centers, it was concluded that no facility now exists that has the required characteristics of the HTML.

D. Site Selection

Final selection of the site for the MTML has not been completed. It is anticipated that it will be located at a DOE National laboratory which has the following characteristics: (1) a strong materials science program to form the nucleus of the basic research effort on high temperature materials, (2) many important projects in applied research and engineering for DOE-high-temperature-materials needs, (3) a long history of expertise in the area of high temperature materials technology, and (4) the extensive support facilities of a large multi-disciplinary energy-mission laboratory.

E. Research Programs for HTML

The research on high temperature materials will be organized into four broad groupings. Areas of expertise encompassed by the staffs of the four groups that will be housed, space permitting, in the HTML itself area as follows:

1. Mechanical Behavior will include studies of creep, fatigue, fracture, and mechanical modeling.
2. Physical Properties will concentrate on thermal, electrical, optical, elastic, and magnetic properties, and thermometry.
3. Structural Characterization will contain facilities for high temperature x-ray and electron diffraction, electron and optical microscopy, and surface characterization methods (LILD,ESCA, etc.). The chief research areas will be phase stability and the kinetics of phase transformations.
4. Materials Synthesis and Preparation will provide specimens for the other groups in the HTML, will provide samples for external researchers, and will conduct research on synthesis techniques (i.e., directionally solidified eutectics).

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1. Title and location of project: High temperature materials laboratory. Site to be determined. Project No. 84-CS-101

Two other groups, Environmetal Interactions and High Temperature Chemistry, representing additional areas of expertise required in broadly based high temperature materials research, will be housed in an adjacent building. Environmental interactions will carry out investigations in the fields of oxidation, diffusion, erosion, mixed gas reactions, liquid metal corrosion, environmental effects on mechanical properties, etc. High Temperature Chemistry research will consider phase and defect equilibria and thermodynamic properties of high temperature materials. The high temperature chemistry of ceramics will be an area of special interest.

F. Estimates of Annual Costs of Operations

The estimates of the annual costs of operations (FY 1984 dollars) for the research activities described in previous sections are based upon 68 people being physically housed in the facility. The estimated annual costs of materials, supplies, and services if $2,000,000. The estimated costs of the utilities if $970,000. The estimated annual costs of personnal including fringe benefits and overhead are $5,225,000. The annual cost for capital equipment not related to construction is estimated at $400,000.

10. Details of cost estimate *

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 20% of construction costs, item b.		$ 2,800
b. Construction costs		14,000
1. Land improvements	$ 250	
2. Building construction (approximately 40,000 sq.ft. at $192 per sq.ft.)	7,700	
3. Other structures	350	
4. Special facilities (laboratory hoods and exhuase system, special temperature and humidity controls, and special equipment for research)	4,800	
5. Utilities (electrical power, water and communications)	900	
c. Office and laboratory furniture and standard research equipment		400
Subtotal		17,200
d. Contingency at approximately 20% of above costs		3,400
Total Project Cost		$ 20,600

*This cost estimate is based on conceptual design studies completed in FY 1982.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High temperature materials laboratory. Site to be determined. Project No. 84-CS-101

11. Method of Performance

Design and inspection will be on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

a. Total project funding	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
1. Total facility costs							
(a) Construction line item...........	$ 0	$ 3,000	$ 7,500	$ 8,500	$ 1,000	$ 600	$20,600
(b) Plant, Engineering and Design (PE&D)	0	0	0	0	0	0	0
(c) Expense funded equipment.........	0	0	0	0	0	0	0
(d) Inventories......................	0	0	0	0	0	0	0
Total Facility Costs...........	$ 0	$ 3,000	$ 7,500	$ 8,500	$ 1,000	$ 600	$20,600

b. Total Related Funding Reqirement Funding Requirement (Estimated Life: 50 years)

1. System operating costs..	$ 2,970
2. Programmatic operating expenses directly related to the facility....................	5,225
3. Capital equipment not related to construction but related to the programmatic effort in the facility...	400
4. GPP* or other construction related to the programmatic effort in the facility..................	0
5. Other costs..	0
Total Other Related Annual Funding Requirements..............................	$ 8,595**

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding
   1. Total facility costs
      (a) Construction line item - No narrative required
      (b) PE&D - No narrative required
      (c) Expense funded equipment - No narrative required
      (d) Inventories - No narrative required

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* General Plant Project.

** These costs are expressed in FY 1984 dollars.

b. Total Related Funding Requirement
The estimated useful life of the HTML is 50 years.
1. Facility operating costs - These estimated costs are for utilities for the building and program activites, maintenance of the building and its systems, and janitorial services.
2. Programmatic operating expenses directly related to the facility - Programmatic operating expenses directly related to the activities described in Item 9 cover consumable materials and supplies' costs, personnel costs including fringe benefits, and miscellaneous costs.
3. Capital equipment not related to construction but related to the programmatic effort in the facility - Capital equipment for programmatic activities is described in Item 9.
4. GPP or other construction related to the programmatic effort in the facility - No narrative required
5. Other costs - No narrative required

14. Incorporation of Fallout Shelters

Efforts will be made, where feasible, to design for additional shelter space at little or no additional costs.

15. Pollution Prevention Abatement and Control

The total cost of this project includes the costs of those measures necessary to assure compliance with Executive Order 12088. Sanitary waste will be discharged into existing sewers connected to adequate sewage treatment facilities. Airborne contaminants will be collected and filtered before the air is released to the atmosphere. Liquid and gaseous effluents and solid wastes resulting from operations within the new facility are not perceived to constitute a threat to the environment.

16. Evaluation of Flood Hazards

This project will be located in an area not subject to flooding determined in accordance with Executive Order 11988.

17. Environmental Impact

In compliance with the National Environmental Policy Act, DOE Order 5440.1, the Council on Environmental Quality Regulations (40 CFR Parts 1500 - 1508), and the DOE NEPA Guidelines (45 FR 20694), an Environmental Assessment will be prepared for this project.

Compliance with both the Clean Air Act and the Clean Water Act will be documented in the Environmental Assessment. As presently conceived, the operation of the completed project will not generate any air or water pollutants.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: High temperature materials laboratory. Site to be determined — Project No. 84-CS-101

There are no known conflicts with the Floodplains/Wetlands Environmental Review Requirements. The site selected will neither be in or adjacent to wetlands or natural floodplains.

There are no known conflicts with either the National Historic Preservation Act or the Endangered Species Act.

18. Accessibility for the Handicapped.

Since the proposed budget includes construction of new buildings or building additions, adequate provisions will be made for accessibility for the handicapped.

Summary of Changes
(dollars in thousands)

FY 1983 Appropriation	$ 233,660
Program Decreases:	
Weatherization	$-145,000
Energy Extension Service	-10,000
EPCA Grants	-24,000
Schools and Hospitals (ICP)	-48,000
Program Direction:	
Decrease of FTE's	$ -3,360
FY 1984 budget request (Program Direction)	$ 3,300

Program Direction $ 3,300,000

Financial and technical assistance activities carried out in FY 1983 and prior-years will be closed-out in FY 1984. The FY 1984 request provides for contracts and personnel expenses associated with close-out activities. Revised personnel levels proposed for FY 1984 are consistent with the planned termination of the grant programs. The request provides for a Full Time Equivalent (FTE) staffing level of 65. The personnel staffing level is intended to provide for termination of all State and Local programs. Of these positions, 15 will be assigned at Headquarters to provide overall program management, administrative support, and general guidance. The remaining 50 FTEs will be located in field offices to provide administrative oversight ofuncosted obligations, monitoring and individual grants awarded late in FY 1983.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Multi-Sector
Energy Conservation - Operating Expenses
Energy Conservation - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Multi-Sector (CE)				
Appropriate Technology				
Operating Expenses........	2,880	1,500	1,500	0
Inventors Program				
Operating Expenses........	5,184	2,000	2,000	0
Energy Conversion and Utilization Technologies				
Operating Expenses........	7,843	9,000	9,000	3,000
Capital Equipment.........	384	0	0	0
Subtotal................	16,291	12,500	12,500	3,000
Program Direction				
Operating Expenses........	182	230	230	102
Subtotal................	182	230	230	102
Total				
Operating Expenses.........	16,089	9,000	9,000	3,000
Capital Equipment..........	384	0	0	0
Multi-Sector.............	16,473	12,730	12,730	3,102
Staffing				
FTP/Total FTEs	9/11	22/22 *	22/22	2/3

Authorization: P.L. 93-577, The Federal Nonnuclear Energy Research and Development Act of 1974.

SUMMARY OF CHANGES

MULTI-SECTOR	
FY 1983 appropriation enacted...	$12,730
Program decreases:	
Eliminate Appropriate Technology Program................................	- 1,500
Eliminate Inventors Program...	- 2,000
Discontinue diesel engine combustion research...........................	- 1,500
Discontinue stationary combustion system research.......................	- 500
Discontinue advanced heat exchanger research............................	- 1,000
Discontinue materials research..	- 3,000
Reduce program direction..	- 128
FY 1984 Budget Request..	$ 3,102

* The FY1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the Budget. In the interim, the Department plans to comply with legislative requirements regarding personnel levels.

Department of Energy
FY 1984 Congressional Budget Request
Energy Conservation
Multi-Sector

Energy Conversion and Utilization Technologies	$ 3,000,000

The Energy Conversion and Utilization Technologies (ECUT) program consists of generic research activities conducted to support private sector development of more efficient energy conversion equipment and utilization processes. The goal of this program is to solidify the technology base used by the private sector in designing and developing processes and equipment in their applications to the transportation, buildings, and industrial energy-use sectors.

Major FY 1982 accomplishments and anticipated FY 1983 accomplishments include the following:

- Developed a new understanding of the sources of unburned hydrocarbon emissions from homogeneous-charge engines.
- Developed a definitive comparison between experimental results and computer simulations to enhance the understanding of flame propagation in DHC and DISC engines.
- Tested separation and oxidation resistance of multiple fractions from several base stock lubricating oils.
- Gathered preliminary data on sliding friction (pin on disk) tests of five ceramic materials at room temperature.
- Completed planning for workshop to set research priorities.

Engine Combustion Technology	$ 2,000,000

The Engine Combustion Technology program supports the development of new technologies to improve the efficiency and fuel flexibility of internal combustion engines. The approach is to apply the advanced research capabilities of national laboratories, universities, and private R&D laboratories to the solution of critical problems arising in the development of improved engines. Advanced techniques to measure, analyze and understand the combustion process are being adopted and applied by industry researchers.

The technologies employed in this project include laser-based measurement techniques and large-scale multidimensional computer solutions of the physical and chemical equations which describe the fluid mechanics and combustion chemistry of engine operation. In-cylinder measurements of velocity, turbulence, stoichiometry, and temperature have been demonstrated, and measurements of combustion intermediates, pollutants, and particulates are being developed. In addition, computer solutions of the intake, fuel spray mixing, combustion, quench, and exhaust processes are being developed.

Research groups have been organized to study homogeneous-charge engines, light-duty diesels, and direct-injection stratified-charge engines. These groups include DOE-sponsored and industry researchers, who work together to identify the key issues, to guide the DOE efforts toward solution of those issues, and to assure that the results are quickly made available to industry.

FY 1984 projects will be directed toward understanding the evolution of turbulence during compression ahead of the advancing flame front and toward developing a more complete understanding of the fuel injection and mixing processes for DHC and DISC engine concepts. Work is closely coordinated with the transportation activities in the conservation programs.

Tribology $ 1,000,000

The Tribology program seeks to enhance the technology base of the science of friction and wear by conducting long-term research on the underlying mechanisms of friction, wear and lubrication in energy converting and utilizing components devices and systems.

FY 1984 activities will include the characterization of components of base stock lubricating oils and the correlation of the lubricity of each component as a function of its molecular structure; the testing of the friction and wear characteristics of dissimilar ceramic materials at elevated temperatures.

Program Direction $ 102,000

Funds requested will provide for 2 FTP and 1 OTFTP positions. Personnel assigned to these positions will develop the overall strategies and plans to provide the integrated program management for the ECUT program.

Energy Conversion and Utilization Technologies
Key Activities Summary
(dollars in thousands)

KEY ACTIVITIES	FY 1983 ESTIMATED ACTIVITIES	FY 1984 PLANNED ACTIVITIES
Combustion and Thermal Sciences	Engine Combustion Continue efforts to analyze combustion process phenomena associated with engine performance in Otto cycle engines (DISC, DHC), concentrating on hydrocarbon, NO and particulate formation in the combustion chamber.	Engine Combustion Continue efforts to analyze combustion process phenomena associated with engine performance in Otto cycle (DISC, DHC) engines, concentrating on hydrocarbon, NO and particulate formation.
Tribology	Tribology Continue structural characterization and calibration of lubricity of base stock oil molecular components; initiate exploration of reciprocating, sliding rolling friction in dissimilar ceramics.	Tribology Complete structural characterization an lubricity testing of base stock oil components. Determine correlation with friction test used for engines.
	Establish the institution of a cooperative industry/government team effort to broker the creation, implementation, and execution of R&D agenda to capture 10% of the energy loss attributable to tribological sinks in the economy.	Complete battery of sliding, reciprocating and rolling friction testing on matrix of dissimilar ceramics at elevated temperatures.
	Assessment: Identify and characterize the tribological sinks in the U.S. economy with the greatest potential for energy conservation. Mechanisms and Design: formulate research plan.	Continue identification and quantification of tribological sinks in U.S. energy economy. ECUT tribology work concentrates on elucidation of mechanisms of friction, wear and lubrication whereas that of the Office of Vehicle and Engine R&D concentrates on solving problems for the Adiabatic Diesel Engine.

DEPARTMENT OF ENERGY

SPR Petroleum Account

[The aggregate amount that may be obligated] For obligations under section 167 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163), as amended by the Omnibus Budget Reconciliation Act of 1981 (Public Law 97-35), for the acquisition and transportation of petroleum to be delivered to the Strategic Petroleum Reserve during Fiscal Year 1985, and for other necessary expenses [is $2,074,060,000], $583,100,000, [in addition to authority provided for Fiscal Year 1982,] to remain available until expended.

Strategic Petroleum Reserve

[Notwithstanding any other provisions of this joint resolution, there is appropriated $242,118,000, to remain available until expended, for Department of Energy "Strategic Petroleum Reserve" to carry out the provisions of sections 151 through 166 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163),] For expenses necessary to carry out the provisions of sections 151 through 166 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163), $216,170,000 to remain available until expended, of which $57,400,000 is to be derived from unobligated prior year balances in this account.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

STRATEGIC PETROLEUM RESERVE

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV			
EXECUTIVE LEVEL V			
SUBTOTAL			
ES-6			
ES-5	1		
ES-4	1	1	1
ES-3	1	2	2
ES-2	2	4	4
ES-1	3	7	7
SUBTOTAL	8	14	14
GS-18			
GS-17			
GS-16			
GS/GM-15	25	19	20
GS/GM-14	41	39	39
GS/GM-13	50	50	49
GS-12	17	14	15
GS-11	6	6	7
GS-10			
GS-9	5	5	7
GS-8	4	3	3
GS-7	12	11	10
GS-6	10	10	10
GS-5	7	5	5
GS-4			
GS-3			
GS-2			
GS-1			
SUBTOTAL	177	162	165
UNGRADED			
TOTAL PERMANENT POSITIONS	185	176	179
UNFILLED POSITIONS, END OF YEAR	1		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	184	176	179

FY 1984 Congressional Budget Request

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

Strategic Petroleum Reserve
(In thousands of dollars)

	FY 1982 Actual		FY 1983 Estimates		FY 1984 Request	
	BA	BO	BA	BO	BA	BO
Petroleum - strategic petroleum reserve						
A. Planning	$ 8,640	$ 10,332	$ 8,000	$ 9,692	$ 6,250	$ 8,700
B. Petroleum acquisition and transportation	—	2	—	—	—	—
C. Storage facilities development and operations:						
1. Phase I	— 1/	37,639	—	—	—	—
2. Phase II	34,065	67,530	48,800	78,300	61,993	65,300
3. Phase III	95,809	11,480	87,000 2/	100,031	57,400	60,700
4. Non-Phase specific ..	41,482	52,382	86,728	82,300	80,364	82,700
Subtotal	$ 171,356	$ 169,031	$ 222,528	$ 260,631	$ 199,757	$ 208,700
D. Program direction	11,436	11,335	11,590	13,534	10,163	10,200
Subtotal	$ 191,432	$ 190,700	$ 242,118	$ 283,857 3/	$ 216,170	$ 227,600 3/
Less: Use of prior year balances	—	—	—	—	-57,400	—
Total SPR Program (on-Budget)	$ 191,432	$ 190,700	$ 242,118	$ 283,857	$ 158,770	227,600
SPR Petroleum Account (off-budget)	3,684,000	3,686,651	2,074,060	1,770,600	583,100	1,866,400
Total SPR Program	$3,875,432	$3,877,351	$2,316,178	$2,054,457	$ 741,870	$ 2,094,000

1/$4,300,000 was reprogrammed from FY 1981 on-budget Petroleum Acquisition and Transportation funds to Phase I in FY 1982.

2/$57,400,000 is proposed to be deferred from FY 1983 into FY 1984 as a result of a revision to the schedule for development of Phase III activities.

3/FY 1983 and FY 1984 BO have been adjusted to reflect the effects of the proposed $57,400,000 deferral.

FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

Strategic Petroleum Reserve
(In thousands of dollars)

	FY 1983	FY 1984
Appropriation (on-budget)	$ 242,118	$ 158,770
Appropriation (off-budget)	2,074,060	583,100
Subtotal, Budget Authority	$2,316,178	$ 741,870
Unobligated Balances, Start of Year ...	77,999	57,400 1/
Unobligated Balances, End of Year	-57,400 1/	---
Total, Obligations	$2,336,777	$ 799,270

1/$57,400,000 is proposed to be deferred from FY 1983 into FY 1984 as a result of a revision to the schedule for development of Phase III activities.

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Strategic Petroleum Reserve

Background

The Strategic Petroleum Reserve (SPR) was created by the Energy Policy and Conservation Act (P.L. 94-163), signed into law on December 22, 1975. The objective of the SPR program is to reduce the vulnerability of the United States to a severe petroleum supply interruption through the acquisition and storage of up to 1 billion barrels of petroleum products. The studies by the National Petroleum Council in 1974 and 1975, in the aftermath of the 1973 Arab oil embargo, recommended that the primary method of achieving this objective have the following elements:

- Storage of crude oil,
- In large scale underground salt caverns,
- In the gulf coast area,
- Connected to major private sector crude oil distribution systems, and
- Financed by the Federal Government.

The authorizing legislation included a storage target of approximately 500 million barrels (MMB) by 1982, and the SPR Plan officially transmitted in January 1977, in accordance with P.L. 94-163, provided for a 500 MMB Government-owned, centralized, crude oil storage system to achieve this target. Subsequently, SPR Plan Amendment No. 1 was submitted to Congress in May 1977 to accelerate the schedule and provide for 500 MMB in storage by the end of 1980. SPR Plan Amendment No. 2, submitted to Congress in May 1978, authorized an expansion of the ultimate Reserve size of 1 billion barrels and provided for eventual implementation of a Government reserve of 750 MMB. Decisions on the timing and method of achieving the fourth 250 MMB increment were deferred.

In early 1979, when the FY 1980 budget was transmitted to the Congress, it was recognized that SPR facility capacity could not be developed to achieve the accelerated oil storage schedule goals set forth in SPR Plan Amendment No. 1. Those storage schedule goals were intentionally ambitious and depended on realization of optimistic assumptions regarding near-term facilities development. The FY 1980 budget represented a more realistic assessment of the technical complexity of storage facilities development; the scope of facilities development required to meet the desired level of SPR systems performance within the constraints of Federal safety and environmental standards; and the project management challenges associated with the use of a relatively small and newly reorganized Federal workforce to oversee the performance of a large private sector workforce organized under many direct Federal contractors.

The FY 1980 budget therefore proposed a major reprogramming of SPR oil funds to facilities development. It also proposed the use of turnkey facilities development for a large portion of the remainder of the SPR program in an effort to avoid further slippages in the facilities schedule.

During 1979, oil purchases were curtailed for policy reasons. By 1980, this decision had a number of effects:

(1) The solicitation for turnkey facilities development was cancelled and funding for Phase III of the SPR was deferred, resulting in a three-year delay in achieving the 750 MMB storage level. Also, decisions regarding a fourth 250 MMB in storage facilities were never made.

(2) Congress rescinded $2 billion in SPR oil funding which had been left unused.

(3) Phase I storage facilities (250 MMB) were completed, but were left substantially underfilled.

(4) In June 1980, Congress enacted the Energy Security Act which required the President to increase the oil stored in the SPR at a minimum rate of 100,000 barrels per day during FY 1981 and beyond. This act also directed that during FY 1981 the SPR was to receive entitlement benefits under the Emergency Petroleum Allocation Act so as to have the effect of allocating lower tier oil to the SPR.

(5) The FY 1981 Department of the Interior and related agencies appropriations law included language which required the President to seek to fill the SPR at an annual average rate of 300,000 barrels per day or a sustained average annual rate which would fully utilize appropriated funds.

In September and October 1980, the Defense Fuel Supply Center awarded contracts to several oil companies for 36.6 MMB of crude oil to be delivered to the SPR in exchange for an equivalent amount of crude oil production from the Naval Petroleum Reserve at Elk Hills. When the Carter Administration budget for FY 1982 was prepared, it was assumed that an additional 40 MMB would be delivered in FY 1981, resulting in total receipts under the entitlements program of $1,845,390,000 in FY 1981.

The SPR program inherited by the new Administration in January 1981 was, therefore, characterized by the following:

(1) The facilities development plan called for 750 MMB in storage by 1989, with no decisions made on the 750 MMB - 1000 MMB increment.

(2) Phase I facilities were available for fill but had been substantially underfilled.

(3) Less than half the oil scheduled for FY 1981 delivery was under contract.

During 1981, there were a number of important developments in the SPR program:

(1) The new Administration adopted and pursued a policy of filling the Reserve as rapidly as possible to the full extent of available storage capacity. During calendar year 1981, the Reserve was filled at the record high rate of 335.8 thousand barrels per day (MBD), and the oil inventory was more than doubled from 107.8 MMB at the end of 1980 to 230.3 MMB at the end of 1981.

(2) On January 28, 1981, oil prices were decontrolled, which resulted in the end of the entitlement program. The SPR received entitlement benefits totalling $542,145,805 of the projected $1,845,390,000. To replace these lost entitlements, a $1,305,000,000 FY 1981 supplemental request was submitted to and, subsequently, appropriated by Congress.

(3) In March 1981, steps were initiated to accelerate the leaching program at Bryan Mound and a modification of the brine disposal permit to increase the maximum brine disposal rate from 680 MBD to 1.1 million barrels per day was submitted to the Environmental Protection Agency. This permit was issued in August 1981.

(4) On August 16, 1981, the President signed the Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35) which contained the following provisions:

  (a) The Act required the President to seek to fill the Reserve at 300 MBD until a storage level of 750 MMB was achieved.

  (b) The Act established a new "SPR Petroleum Account" in the Treasury, placing SPR oil spending "off-budget" beginning in FY 1982 and providing for the deposit and subsequent reappropriation of SPR oil sales receipts.

  (c) The Act required the submission of quarterly reports to the Congress on SPR implementation progress and problems and also required that a study on the size of the SPR be conducted.

(5) On August 20, 1981, the Department signed a long-term commercial contract with Petroleos Mexicanos (PEMEX), Mexico's state-owned oil company, for the purchase of 110 million barrels of crude oil through 1986. This contract is the largest SPR oil purchase to date and is providing a reliable long-term source of oil with an average delivery rate of 50,000 barrels per day.

(6) Two reprogramming proposals were transmitted to Congress during 1981. In June 1981, a reprogramming action for $18,000,000 was approved to fund the condemnation judgment for Bryan Mound. In September 1981, a second reprogramming action for $7,334,070 was approved to fund a condemnation settlement for West Hackberry. These funds for additional Phase I costs were reprogrammed from funds appropriated for Petroleum Acquisition and Transportation. A third reprogramming, to cover the Banister arbitration settlement for construction of the Weeks Island pipeline, was approved in August 1982. This $4,300,000 reprogramming was funded out of carryover funds originally appropriated—on-budget—for Petroleum Acquisition and Transportation..

During 1982, there were further developments regarding the SPR program, as follows:

(1) In January 1982, the National Environmental Policy Act process was completed for Phase III of the SPR facilities development activity, with the approval of a Record of Decision.

(2) In April 1982, a storage level of 250 MMB was reached and in light of the improved world oil supply situation represents a significant improvement in our level of supply protection.

(3) On August 3, 1982, the Energy Emergency Preparedness Act of 1982 (Public Law 97-229) was signed into law. The Energy Emergency Preparedness Act establishes a minimum required fill rate of 300,000 barrels per day to the extent funds are available and until there are 500 million barrels (MMB) in the Reserve, unless there is in effect a finding by the President that compliance with such a rate would not be in the national interest. During the period of such a Presidential finding, the minimum required fill rate shall be 220,000 barrels per day or the highest practicable fill rate achievable subject to the availability of funds. This legislation also permits the use of funds in the SPR Petroleum Account to fund interim storage expenses necessary to meet these minimum fill rates, not to exceed 10% of the total amount in the account obligated in each fiscal year.

This Act also required the President to prepare and submit to Congress the following plans and reports:

(a) Strategic Petroleum Reserve Drawdown Plan,
(b) Strategic Petroleum Reserve Drawdown and Distribution Report, and
(c) Regional Reserve Report.

(4) On August 24, 1982, the Department of Energy signed an agreement with Petroleos Mexicanos (PEMEX) to purchase additional crude oil for the Strategic Petroleum Reserve. The agreement provided an advance payment of $1 billion to PEMEX, with the oil to be delivered beginning October 1982.

(5) On December 1, 1982, the President advised the Congress of his finding that it would not be in the national interest to fill the SPR at the rate of 300,000 barrels per day during FY 1983. On the same date, the President transmitted to the Congress the Strategic Petroleum Reserve Drawdown Plan (SPR Plan Amendment No. 4) and the Strategic Petroleum Reserve Drawdown and Distribution Report, as required by Public Law 97-229.

(6) The Secretary of Energy signed a Declaration of Taking regarding the Big Hill site on December 23, 1982. It was filed with the U.S. District Court for Eastern Texas on December 28, 1982, thus acquiring the Big Hill site for DOE by condemnation.

Benefits of the Strategic Petroleum Reserve

The SPR increases the protection of the United States from oil supply disruptions by:

(1) Reducing upward pressure on world oil prices and, thus, potentially reducing the cost of all continuing U.S imports.

(2) Reducing the international transfer of wealth and, therefore, the ultimate loss in industrial output.

(3) Possibly deterring oil supply disruptions by reducing the cost of the disruption to the United States and increasing the cost of the potential source of the disruption.

It also can provide the President time to attempt to resolve an oil supply disruption through diplomatic efforts.

This insurance value of the SPR program has been evaluated using a wide range of analytical methods and assumptions in studies by the Department and in the academic community. Most recently, the Department prepared the Report to the President and the Congress on the Size of the Strategic Petroleum Reserve which provides an extensive description of the economic and financial costs and benefits of the Reserve.

Approach to the FY 1984 Budget Request

Key policy decisions which form the basis for the FY 1984 Request include:

(1) The FY 1983 fill rate is projected to be 216,000 barrels per day. This will essentially fill the available permanent storage capacity at the Reserve and result in a cumulative oil inventory of 357 million barrels by the end of FY 1983. This continued high rate of SPR fill ... coupled with the administration's other emergency preparedness accomplishments ... has lessened the nation's vulnerability to oil supply interruptions.

In light of this, the Administration plans to fill the SPR at a rate of 145,000 barrels per day in 1984, bringing the cumulative inventory level to 410 million barrels by the end of the fiscal year. The fill rate reflects a careful balance between the higher levels of protection already provided by the SPR inventory, improvements in the domestic and international energy supply situation, and the need to further enhance the security afforded by the SPR.

(2) The Administration remains committed to a Government-owned Strategic Petroleum Reserve of 750 million barrels. The 1984 budget provides no construction funds for the final 150 million barrel increment of the system. The schedule for the development of this increment will be re-analyzed and a decision made in the context of the 1985 budget. The decision on the development schedule will take into account: protection levels, import dependence, excess production capacity, national security threats, displacement of private stocks and stock levels held by our IEA allies. However, site acquisiton and detailed design activities will continue.

$57,400,00 of Phase III development funds are no longer required in FY 1983 as a result of this schedule revision. These funds are deferred to offset FY 1984 Phase III funding requirements.

(3) The practice established by the Omnibus Budget Reconciliation Act of 1981 regarding use of the off-budget SPR Petroleum Account to finance oil acquisition, transportation and related expenses is continued.

(4) The practice of requesting sufficient budget authority to have advance orders for the following year's oil deliveries is continued.

Other technical schedule and cost considerations include:

(1) A downward revision in oil price projections from estimates included in the FY 1983 budget to reflect oil market developments over the past year.

(2) An upward revision in the electric power cost requirements for leaching of storage capacity to reflect experience in fuel adjustment charges since the FY 1983 estimates were prepared.

(3) An increase in Phase I capacity due to the decision to use Sulphur Mines cavern gallery 2-4-5 for oil storage under the revised technical approach for a total combined storage capacity of approximately 260 million barrels. To maintain a 750 MMB storage configuration, Phase III West Hackberry is, therefore, scaled back by one 10 MMB cavern.

(4) Other upward revisions in capacity estimates due to experience to date in implementing solution-mining techniques.

FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
STRATEGIC PETROLEUM RESERVE

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Planning	$ 8,640	$ 8,000	$ 8,000	$ 6,250
Storage facilities development and operations:				
Phase I	— 1/	—	—	—
Phase II	34,065	48,800	48,800	61,993
Phase III	95,809	87,000	87,000 2/	57,400
Non-phase specific	41,482	86,728	86,728	80,364
Subtotal	$ 171,356	$ 222,528	$ 222,528	$199,757
Program direction	11,436	11,590	11,590	10,163
Subtotal	$ 191,432	$ 242,118	$ 242,118	$216,170
Less: Use of Prior Year Balance	—	—	—	-57,400
SPR program (on-budget)	$ 191,432	$ 242,118	$ 242,118	$158,770
SPR petroleum acquisition and transportation account (off-budget)	$3,684,000	$2,074,060	$2,074,060	$583,100
Total SPR Program	$3,875,432	$2,316,178	$2,316,178	$741,870
Staffing FTP/Total FTE's	178/199	176/197	176/197	179/200

Authorization: Section 151-167, P.L. 94-163

1/ $4,300,000 was reprogrammed from on-budget FY 1981 Petroleum Acquisition and Transportation funds to Phase I in FY 1982.

2/ $57,400,000 is proposed to be deferred from FY 1983 into FY 1984 as a result of a revision to the schedule for development of Phase III activities.

FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES

Strategic Petroleum Reserve
(dollars in thousands)

FY 1983 Appropriation enacted/base	$ 2,316,178
Less: Proposed deferral	-57,400
New FY 1983 revised base	$ 2,258,778
Planning	
o Reduced need for external contractors for studies and analyses of major issues concerning the development and use of the Strategic Petroleum Reserve	-1,750
Subtotal	$ -1,750
Storage Facilities Development Operations	
o Phase II	
The increase is for the leaching at Bryan Mound, West Hackberry and Bayou Choctaw	+13,193
o Phase III	
The decrease is due to a rescheduling of Phase III development	-29,600
o Non-Phase Specific	
The decrease is due to success in reducing the backlog of unfunded safety, security, and reliability projects	-6,364
Subtotal	$ -22,771
Program Direction	
o The decrease is related to a decrease in contractual services.	
Subtotal	-1,427
	$ -1,427
Petroleum Acquisition and Transportation	
o The decrease in Petroleum Acquisition and Transportation reflects lower oil price projection and the volume of oil on order at the end of FY 1983	$-1,490,960
Subtotal	$-1,490,960
FY 1984 Budget Request	$ 741,870

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1983 Appro-priation	FY 1984 Base	FY 1984 Request
Planning............................	$8,000	$8,000	$6,250

The FY 1984 request for Planning is $6,250,000. This is a $1,750,000 decrease from the amount appropriated for FY 1983 reflecting a reduced need for contracted studies as the SPR program matures and the availability of prior year funds.

The basic goal of the planning activity is the funding of analyses pertinent to major issues concerning the development, support, and use of the SPR facilities.

More specifically, the planning activity funds feasibility studies, impact studies, the development of operational and logistics support contingency plans, environmental monitoring and assessments, and the analyses of program management data. SPR operations are directly supported through safety and health planning and analysis, engineering studies, physical and chemical analysis of crude oil mixtures in storage or being acquired and logistics analysis/information retrieval in support of oil transportation. In addition, the planning activity supports SPR emergency drawdown capability by providing for contingency operations planning, drawdown logistics planning and information, and an operational readiness testing program. SPR strategic planning is enhanced by ongoing analysis of oil acquisition strategies, configuration alternatives, and the economic impact of SPR policies. Environmental responsibilities are met through continous monitoring and analyses of on-site activities and off-site brine disposal. Finally, this activity supports the overall SPR program by providing systems design, planning and data analysis for program evaluation, individual project management, and cost/accountability systems.

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1983 Appro-priation	FY 1984 Base	FY 1984 Request
Storage Facilities Development and Operations....................	$222,528	$222,528	$199,757[1]

The FY 1984 request for Storage Facilities Development and Operations is $199,757,000.

The $199,757,000 requested consists of $61,993,000 for the expansion of existing sities (Phase II), $80,364,000 for facility development activities not specifically associated with any one of the phases (Non-Phase Specific) and $57,400,000 for Phase III development.

Phase I

Phase I consists of the development of five underground storage sites, the pipelines required to connect the storage sites to distribution facilities and a Federally-owned marine oil terminal at St. James, Louisiana. The Phase I storage sites are Bryan Mound in Texas and Bayou Choctaw, West Hackberry, Sulphur Mines and Weeks Island, all in Louisiana. Four of the storage sites were sites with existing solution-mined (leached) caverns and the fifth was a conventional salt mine. Construction of Phase I facilities began in July 1977, and was completed in 1980. All five sites are available for oil fill with a combined storage capacity of approximately 260 million barrels.

Phase II

Phase II is the currrent expansion of three Phase I sites by 290 million barrels. The Bryan Mound site will be expanded by 120 million barrels; the West Hackberry site will be expanded by 160 million barrels, and an additional cavern, which has an existing capacity of 10 million barrels, is being acquired at Bayou Chocktaw. Construction at Bryan Mound and West Hackberry for solution-mining is completed. Solution-mining of new caverns commenced at Byran Mound in March 1980, and at West Hackberry in May 1981.

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[1] $57,000,000 is proposed to be deferred from FY 1983 into FY 1984 as a result of a revision to the schedule for development of Phase III activities.

The total cost of Phase II facilities is estimated to be $755,629,000. This is an increase of $54,526,000 over the FY 1983 budget forecast, principally due to increases in utilities; specifically, in electric power. Several factors are responsible for this large increase in estimated power costs: increases in rate per kwh, increases in fuel adjustment charges, and increases in estimates of power needs as a result of actual leach/fill experience.

While the total estimated cost of Phase II facilities is greater than forecast in the FY 1983 budget, the amount required by FY 1984 has actually decreased since the FY 1983 budget was submitted. Previous estimates were for $63,373,000 but the FY 1984 request is for $61,993,000. Several increases and decreases are involved, but the major factor in the FY 1984 Phase II decline is a stretch-out of leaching and cavern conversion at Bayou Choctaw.

Phase III

Phase III consists of a further expansion of two existing sites by 61 million barrels ... 40 million barrels at Bryan Mound and 21 million barrels at West Hackberry and a new 140 million barrel site at Big Hill, Texas.

At Bryan Mound, detailed design was initiated in April, 1981, the drilling contract was awarded in February 1982 with drilling initiated in July, 1982. Expansion of West Hackberry will begin in FY 1983.

Big Hill site acquisiton and completion of detailed design work is proceeding on schedule and will be completed in 1984. A decision on whether to proceed with construction on this site will be re-analyzed in the context of the 1985 budget.

Non-Phase Specific

Non-Phase Specific was established as a budget activity in FY 1981 to finance SPR facilities requirements which are not directly associated with specific development phases of the SPR. Some SPR sites, for example, have Phase I, Phase II and Phase III elements. Other sites which were only part of Phase I, require operation and maintenance resources as they evolve to a maintenance mode after completion of construction and fill. In addition, there is a continuing requirement for safety, reliability and security upgrades and a lesser requirement for continuing engineering support.

The FY 1984 request for Non-Phase Specific is $80,364,000, a decrease of $6,364,000 from the amount appropriated for FY 1983 due to a reduction in the backlog of safety, reliability and security upgrades. The following major functions will be supported with these funds.

	(BA in Thousands)	
	FY 1983	FY 1984
Continuing Engineering	$ 8,648	$ 7,988
Operations and Maintenance	38,345	43,306
Safety, Reliability and Security Upgrades..........................	39,735	29,070
Total............................	$86,728	$80,364

Continuing Engineering is a subcategory required to budget for those engineering services that are applicable on a continuing basis to activities that have an overall project impact rather than a specific phase or site impact. The purpose of the continuing engineering effort is to identify and resolve technical issues, and to institute systems and practices to assure that SPR facilities are integrated on a systems basis. This function includes efforts in support of the following activities:

	(BA in thousands)	
	FY 1983	FY 1984
System Engineering - System design, integration and system operation and management.	$ 6,000	$ 4,400
Geotechnical Support - Conducts geothechnical investigations, site characterization studies, and provides engineering design assistance regarding geotechnical concerns.	2,000	2,900
Drilling Sustaining Engineering.	250	250
Quality and Reliability Assurance.	398	438
Total Continuing Engineering	$ 8,648	$ 7,988

The Operations and Maintenance (O&M) function provides funding which will be required for as long as the SPR is in operation. In general, the practice has been to include most operations and maintenance costs for a site in the appropriate Phase budget through fill of the site. The increase in O&M funding in this Non-Phase Specific category is in part caused by a shift in cost attribution for on-going operations and maintenance functions after completion of Phase I fill during FY 1982. The following table describe proposed uses of Operations and Maintenance funds in FY 1984.

	(BA in thousands)	
	FY 1983	FY 1984
Operations - Ongoing operations, oil injection operations for expansion sites; normal maintenance for non-expansion sites; procurement of spare parts for site maintenance; O&M contractors fee, drawdown exercises and special reports.	$28,500	$33,096
Security - Security guards and equipment at all sites, emergency radio systems.	5,071	4,448
Utilities - Electrical power for Bayou Choctaw, Weeks Island, and Sulphur Mines.	650	1,244
Environmental - On-going environmental requirements.	2,181	1,257
Support Services - Subcontract funds for Operations and Maintenance Support, including crude oil gauging, analysis and quality tests; maintenance of brine disposal wells; and transportation and storage of brine and oil samples.	1,943	3,261
Total Operations and Maintenance	$38,345	$43,306

The FY 1984 Operations and Maintenance budget of $43,306,000 is an increase of $4,961,000 over the FY 1983 budget. This increase is made up of funds for the transition to a new O&M contractor when the existing contract expires; state taxes resulting from a recent Supreme Court decision in which Federal Government contractors were made liable for state taxes on all their purchases; and a small amount for escalation.

The Safety, Reliability and Security Upgrades function addresses the need for modifying existing sites to asure that mission objectives can be met. SPR facilities were originally designed and constructed to meet industrial standards. Current Department of Energy criteria for safety (e.g. fire protection) and security are more stringent than industrial standards, in some instances requiring facility enahancements. In addition, special safety/hazard analyses and actual operating experience have identified specific requirements for systems upgrades.

Vulnerability analyses have pointed out the need for better security systems to protect the SPR from outside forces in an emergency. Reliability upgrades range from storing spares to emergency generators. Each task has been selected from a list of candidates by a rigorous review and prioritization process.

The funding levels for upgrades required at the sites for FY 1983 and FY 1984 are compared below:

	(BA in thousands)	
	FY 1983	FY 1984
Bryan Mound	$ 5,512	$ 4,395
West Hackberry	16,342	17,971
Bayou Choctaw	3,233	627
Weeks Island	5,196	1,762
Sulphur Mines	3,538	2,570
St. James	5,914	1,745
Total	$39,735	$29,070

Strategic Petroleum Reserve

FY 1984 CONGRESSIONAL BUDGET REQUEST
COMPOSITION OF THE GOVERNMENT RESERVE

	MMB
Phase I - Existing Sites	259
Phase II - Expansion of Existing Sites	
Bryan Mound	120
West Hackberry	160
Bayou Choctaw	10
Subtotal	290
Phase III	
West Hackberry	21
Bryan Mound	40
Big Hill	140
Subtotal	201
Cumulative Total	750

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Program Direction	$11,590	$11,590	$10,163

The FY 1984 request for Program Direction is $10,163,000, a $1,427,000 decrease from the amount appropriated for in FY 1983. This reduction reflects a reduction in the need for contractual services.

Program Direction funding provides for the salaries and expenses necessary to plan and manage the Strategic Petroleum Reserve.

The current ceiling of full-time equivalent (FTE) positions for full-time permanent (FTP) and other than full-time permanent (OTFTP) positions for the FY 1982 and FY 1983 budgets and the FY 1984 Request are shown below.

	FY 1982	FY 1983	FY 1984
FTP	178	176	179
OTFTP	21	21	21
TOTAL	199	197	200

The FY 1984 request provides a total of 179 full-time equivalent positions for full-time permanent positions; three above the FY 1983 ceiling and one above the FY 1982 ceiling.

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Petroleum Acquisition and Transporation	$2,074,060	$2,074,060	$583,100

The FY 1984 request for Petroleum Acquisition and Transportation is $1,490,960,000 below the FY 1983 appropriation. This reduction is due to revised oil fill and oil price projections and the volume of oil on order at the end of FY 1983.

Using current oil price projections the Department can fill at 216,000 barrels per day in FY 1983 and 145,000 barrels per day in FY 1984 and have approximately 18 million barrels on order for delivery in FY 1985

Based on the FY 1984 baseline for permanent capacity and the foregoing policy assumptions, Table 1 outlines the near-term SPR oil acquisition requirements.

Table 1
Strategic Petroleum Reserve
SPR OIL ACQUISITION

FY 1984 Request	FY 1982	FY 1983	FY 1984
Annual Deliveries (MMB)	79.1	78.8	52.9
Cumulative Fill (MMB)	277.9	356.7	409.6
Fill rate (MBD)	217	216	145
On order, end of year (MMB)		55.2	18.3

Table 2 below compares estimated SPR average annual crude oil prices for FY 1982 and subsequent years. This comparison reflects the fluctuation in assumptions about conditions in the world crude oil market.

Table 2

Strategic Petroleum Reserve

OIL PRICE ASSUMPTIONS 1/
(Average annual price per barrel)

Fiscal Year	FY 1982 Budget Current Dollars	FY 1983 Budget Current Dollars	FY 1984 Budget Current Dollars
1982	$42.29	$36.55	$34.33
1983	46.72	37.39	34.38
1984	51.11	39.47	35.08
1985	55.51	41.77	36.95
1986	60.02	44.14	39.08
1987	64.66	46.60	41.25
1988	69.61	49.51	43.53

1/ Assumed prices include differential from imported U.S. refiner acquisition costs to reflect the added cost of SPR compliance with the Cargo Preference Act.

FY 1984 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

Strategic Petroleum Reserve

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Petroleum Acquisition and Transportation	Oil to be delivered at approximately 216,000 barrels per day.	Oil to be delivered at approximately 145,000 barrels per day to a cummulative inventory level of nearly 410 MMB.
Phase II Facilities	Continued development of Phase II Facilities with leaching continuing at the three sites and fill operations at Bryan Mound and West Hackberry.	Continued development of Phase II Facilities by leaching and acquisition of an additional cavern at Bayou Choctaw.
Phase III Facilities	Continue development of expansion sites, Bryan Mound and West Hackberry. Complete Big Hill design and site acquisition.	Continue development of expansion sites, Bryan Mound and West Hackberry.
Non-Phase Specific	Continued Operations and Maintenance, Continuing Engineering and Upgrades for Safety and Reliability at existing facilities.	Continued Operations and Maintenance, Continuing Engineering and Upgrades for Safety and Reliability at existing facilities.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

[Economic Regulation]

Emergency Preparedness and Energy Regulation

For necessary expenses in carrying out [the] emergency preparedness and energy regulation activities including activities of the Enonomic Regulatory Administration[,] and the Office of Hearings and Appeals [and emergency preparedness activities, $35,106,000: Provided, That $2,000,000 of the funds herein appropriated shall be available for the fuels conversion program, of which not less than $1,500,000 shall be available only for expenses in issuing prohibition orders under the Powerplant and Industrial Fuel Use Act and other related laws] $22,591,000.

Explanation of Change

Proposed appropriation language deletes provisions contained in the Department of Interior and Related Agencies, 1983 appropriation act applicable to activities for which no funds are requested in FY 1984.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

EMERGENCY PREPAREDNESS AND ECONOMIC REGULATION

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV	1	1	1
EXECUTIVE LEVEL V			
SUBTOTAL	1	1	1
ES-6			
ES-5	4	3	3
ES-4	7	8	8
ES-3	4	4	4
ES-2	5	3	3
ES-1	2	3	3
SUBTOTAL	22	21	21
GS-18			
GS-17			
GS-16			
GS/GM-15	76	51	37
GS/GM-14	138	88	56
GS/GM-13	96	77	54
GS-12	96	67	40
GS-11	39	23	13
GS-10		2	1
GS-9	24	20	15
GS-8	17	13	8
GS-7	50	42	37
GS-6	19	15	8
GS-5	20	14	7
GS-4	2	5	1
GS-3		2	1
GS-2			
GS-1			
SUBTOTAL	577	419	278
UNGRADED			
TOTAL PERMANENT POSITIONS	600	441	300
UNFILLED POSITIONS, END OF YEAR	3		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	597	441	300

FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

EMERGENCY PREPAREDNESS AND ENERGY REGULATION-OPERATING EXPENSES

(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$35,106	$22,591
Proposed Supplementals:		
Pay Cost	875	--
Subtotal, Budget Authority	35,985	22,591
Receipts and Reimbursements:		
*Unobligated Balances, Start of Year	4,489	--
Unobligated Balances, End of Year	--	--
Total, Obligations	$40,470	$22,591

*Includes $3,000,000 reappropriated during FY 1982 for use by the Economic Regulatory Administration and $1,489,000 of unobligated balances from the Energy Conservation appropriation which are available for use by the Emergency Preparedness program.

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

EMERGENCY PREPAREDNESS AND ENERGY RESEARCH REGULATION

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Emergency Preparedness	10,045	5,365	5,230
Coal Utilization	—	2,070	—
Utility Programs	175	—	—
Compliance	5,200	20,015	7,133
Petroleum Operations	2,792	2,580	1,145
Program Administration	1,065	676	3,583
Office of Hearings and Appeals	4,800	5,275	5,500
Subtotal, Emergency Preparedness and Energy Regulation	24,077	35,981	22,591
Reappropriation	38,200	3,000	—
Less: Proposed Pay Raise Supplemental	—	-875	—
Total, Emergency Preparedness and Energy Regulation	62,277	38,106	22,591

Emergency Preparedness

FY 1984 CONGRESSIONAL BUDGET

PROGRAM OVERVIEW

INTRODUCTION

The Energy Emergency Preparedness Program reflects the importance of energy to the nation's health, welfare and security, and the need for a central point of coordination for energy emergency preparedness activities. It is the Administration's policy to allow the marketplace to respond to major energy supply disruptions, without undue and unnecessary interference by government regulatory programs. The goal of the Emergency Preparedness Program is to provide for an ongoing capability for the coordination of effective energy emergency preparedness plans and programs designed to reduce the vulnerability of the nation to energy supply disruptions through primary reliance on market mechanisms coupled with use of the Strategic Petroleum Reserve, and other programs designed to facilitate market-based responses to energy emergency situations.

FY 1983 Accomplishments Include:

- o Strategic Petroleum Reserve
  - Complete Energy Emergency Preparedness Act of 1982 mandated reports;
    - o SPR Drawdown Plan, Amendment No. 4,
    - o SPR Drawdown and Distribution Report,
    - o Staff report on SPR use issues including analysis of various SPR drawdown approaches and their respective implications.
  - Continue preparation of SPR Distribution Management Manual and a handbook concerning procedural guidelines for SPR drawdown decisionmaking.
  - Conduct the Phase B distribution readiness exercise for the SPR, and produce an after-action report.

- o International Energy Preparedness
  - Participate in the IEA Fourth Allocation System Test (AST-4), and produce an after-action report and recommendations.
  - Continue support for various IEA, NATO, and other international energy emergency preparedness programs.
  - Develop a detailed NATO National Oil Board plan and test guide.
  - Participate in the WINTEX-CIMEX NATO defense emergency preparedness exercises.
  - Continue development of program to facilitate U.S. company participation in the Emergency Sharing System of the International Energy Program.
  - Begin a number of classified international energy security activities.
- o Defense Energy Emergency Preparedness
  - Continue development of procedures for responding to Defense Production Act requests, working with an inter-agency task force; Proceed with new regulations and/or Memoranda of Understanding to implement these procedures as appropriate.
  - Continue Jones Act Waiver Procedures; Act on 5-7 Jones Act Waiver Requests.
  - Continue development of continuity of government plans, and maintain operational readiness at designated relocation sites.
  - Continue analysis of mobilization energy requirements.
  - Continue support for Emergency Mobilization Preparedness Board activities, Complete work on action plans for Task Groups.
  - Plan for and participate in national defense readiness exercises to be held in FY 1984.
- o General Contingency Planning Activities:
  - Complete preparation of emergency public information operations manual and design of test procedures for confirming workability.
  - Continue studies of economic impacts of energy supply disruptions, and development of selected mitigation alternatives.
  - Continue studies of private stockpiles of fuel supplies, and interrelationships of private stockpiling decisions, to energy supply situations.
  - Continue analysis as needed of institutional impediments to free market responses to energy supply disruptions.

- Continue development of management operating procedures for DOE responses to energy emergencies, and establishment of procedural and communications links with other Federal entities.

- Complete preparation and submission to Congress of four reports required by the "Energy Emergency Preparedness Act of 1982:"

  o Report on "Comprehensive Energy Emergency Response Procedures" (completed)

  o Report on "Regional Petroleum Reserves" (completed)

  o Report on "Strategic Alcohol Fuel Reserves" (completed)

  o Report on "Economic Impact of Energy Supply Disruptions"

o Energy Emergency Operations and Implementation:

- Continue revitalization of national defense executive reserve program, and conduct of tests and training sessions using updated handbooks, program plans and organization plans.

- Continue development of procedures and mechanisms for communicating with state and local governments, and with private sector groups during an energy emergency; Maintain DIALCOM electronic mail system.

- Maintain and enhance the Energy Situation Reporting System for early alert and analysis capability with respect to energy emergencies.

- Maintain and enhance the designated operations locations for responding to energy emergencies, including updating reference materials and testing communication systems/procedures.

o Risk Assessment Projects:

- Continue selected studies relating to vulnerability of the electric utility system, continue studies relating to vulnerability of pipelines including the Alaska pipeline, and SPR delivery system.

- Continue periodic risk assessment projects relating to potential incidents which may occur during FY 1983.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Emergency Preparedness and Energy Regulation
Emergency Preparedness - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Emergency Preparedness				
Emergency Planning * Operating Expenses...	$ 2,580	$ 864	$ 864	$ 834
Emergency Operations * Operating Expenses...	3,230	935	935	830
Program Direction Operating Expenses	4,235	3,391	3,566	3,566
Subtotal...........	4,235	3,391	3,566	3,566
Total Emergency Preparedness Operating Expenses..	$10,045	$ 5,190	$ 5,365	$ 5,230

*Includes indirect support costs for Emergency Preparedness staff

Staffing FTP/Total FTEs	100/104	69/71	69/71	70/72

Authorization: Federal Power Act Sections 202 (a,c-e), 311; Defense Production Act - Sections 101 (a-c), 708 (b); Public Utility Regulatory Policies Act - Sections 210, 204, 209, 607; Natural Gas Policy Act - Title III; Power Plant and Industrial Fuel Use Act - Sections 404, 405; Department of Energy Act - Sections 101, 102; International Emergency Economic Powers Act - Title III; Trade Expansion Act; Energy Policy and Conservation Act - Sections 106(a)(2), 106(b), Sections 151-161, 202, 251; Clean Air Act - Section 110 (f); Energy Emergency Preparedness Act of 1982; Executive Orders 11490, 10647, 10421, 10490, 10480

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Emergency Preparedness and Energy Regulation
Emergency Preparedness
(dollars in thousands)

FY 1983 Appropriation enacted....................	$5,190*
Built in increases and decreases:	
Pay cost supplemental........................	175
FY 1984 base............................	$5,365
Program increases and decreases:	
Emergency Planning	
o Increase contract and personnel support for international security analysis/ econometric analyses, supply enhancement analyses, and defense energy emergency preparedness activities	+ 332
o Terminate contract and personnel support for Energy Emergency Preparedness Act activities	- 220
o Decrease impact mitigation analyses and contract/personnel support	- 142
Emergency Operations	
o Reduce contract support for ADP/telecommunications energy situation awareness activities	- 126
o Increase contract and personnel support for energy supply adequacy and risk analyses, and for executive reserve administrations	+ 113
o Decrease contract and personnel support for energy situation reporting system	- 92
Program Direction	
No change	
FY 1984 budget request............................	$5,230

* Excludes $250,000 for permitting of international electricity transmission facilities. This activity has been transferred to the Economic Regulatory Administration.

NARRATIVE JUSTIFICATION

FY 1984 EMERGENCY PREPAREDNESS GOALS/OBJECTIVES

The FY 1984 Congressional Budget Request is $5,230,000, approximately equal to the FY 1983 budget request. During FY 1984, the Emergency Preparedness Program will be directed towards enhancement of national security-related accomplishments achieved during FY 1983. Defense preparedness including support for the Emergency Mobilization Preparedness Board will be a priority. Emergency plans and procedures in this area which were delayed by unanticipated Energy Emergency Preparedness Act requirements and international energy security activities in FY 1983 will be continued in FY 1984. Operations readiness initiatives undertaken or ongoing in FY 1983 will be continued in FY 1984 at approximate level which in the event of an energy emergency, will enable the assessment of national security needs and the identification of necessary response measures. Emergency planning and operations readiness activities not directly involving national security considerations will continue on an "as needed" basis.

In carrying out these activities, the program will continue its emphasis on the maintenance of in-house expertise for planning and operations as the most effective strategy for accomplishment of Administration policy objectives during an energy emergency. Accordingly the program will continue to minimise use of contractual support except in specific situations where in-house expertise is insufficient to carryout complex energy emergency technical functions and/or analyses.

EMERGENCY PLANNING

	FY 1983 Approp.	FY 1984 Base	FY 1984 Request
Emergency Planning	$ 864	$ 864	$ 834

The FY 1984 budget request for Emergency Planning is $834,000, a decrease of $30,000 from the FY 1983 budget request. This level of resources provides required resources for solving practical energy emergency problems, and for continuing development of response measures and analysis of policy issues associated with energy supply emergencies. Activities will focus on international energy security as well as utilization of the SPR. SPR distribution procedures will be reviewed, updated and tested. Assessment of the vulnerability of the SPR distribution system will continue with work on a major analysis. Support will be continued for International Energy Agency (IEA), NATO, and other international energy emergency preparedness programs. IEA related planning will focus on the International Energy Program and issues related to the International Emergency Sharing System. After-action reports and analyses will be prepared as a result of experience gained in AST-4, conducted in FY 1983. NATO related planning will refine and test operations procedures for the NATO National Oil Board as they relate to oil supply and distribution schemes.

The Emergency Mobilization Preparedness Board will be supported through participation in the various Working Groups as well as staff assistance for the Executive Secretariat. Studies of private stockpiles of fuel supplies, and interrelationships of private stockpiling decisions, both domestically and internationally will continue. Analyses of institutional impediments to free market responses to energy supply disruptions will also be conducted.

Emergency Planning will also conduct preparedness exercises including testing the Departmental management operating procedures completed in FY 1983. Inhouse studies on economic impacts of energy supply disruptions will continue. Work will also continue on scenarios profiling potential energy emergencies. Projected levels of effort for these activities are as follows:

Emergency Planning

FY 1984 CONGRESSIONAL BUDGET

KEY ACTIVITY SUMMARY
(dollars in thousands)

Key Activity	Estimated Activities FY 1983	Planned Activities FY 1984
Emergency Planning	29 FTEs	30 FTEs
Supply Enhancement	Continued development and test of SPR distribution, i.e. logistics.	Continue planning and analysis for SPR use. Begin planning for actual SPR Drawdown Test to occur in FY 1985.
	Continue assessment of SPR vulnerability with specific studies, reports	Continue implementation of SPR Drawdown Plan, possible rulemakings, changes to manuals, contracts.
		Begin international coordination of factors involving stock drawdown decisionmaking
	2 FTEs	4 FTEs
EEPA Act Activities	Prepare various reports/plans as required by Energy Emergency Preparedness Act of 1982	Activities completed
	10 FTEs and contract support of $250 (Includes $150 of FY 1982 carryover funds.)	0 FTEs

Key Activity	Estimated Activities FY 1983	Planned Activities FY 1984
International Energy Security Activities	Continue IEA actions including mechanisms to support voluntary U.S. company participation in IEA in emergency	Continue technical support for IEA, NATO, other international energy agency activities. Technical support and analysis for bilateral energy matters.
	Continue NATO plannning with emphasis on NATO oil supply and distribution scheme. Conduct AST-4, NATO exercises.	Continue work in conjunction with EMPB, NSC, DOD ongoing projects, on Intl energy security matters.
	Begin EMPB, NSC, and DOD directed international energy security-related activities	Begin planning for AST-5, NATO exercises
	7 FTEs and contracts of $250 from FY 1982 carryover funds	10 FTEs and contract support of $248
Impact Mitigation	Continue work and analysis of policies and programs to support free market approach.	Continue work and analysis of policies and programs to support free market approach.
	Continue studies concerning economic response measures for severe energy supply disruptions.	Continue studies concerning economic response measures for severe energy supply disruptions.
	Continue analysis of private sector stockpiling of fuel supplies, and development of cooperatives as appropriate.	Continue analysis of private sector stockpiling of fuel supplies, and development of cooperatives as appropriate.
		Plan and conduct tests of impact mitigation strategies.
	3 FTEs and contract support of $880 (Includes $600 from FY 1982 carryover funds.)	4 FTEs and contract support of $126

Key Activity	Estimated Activities FY 1983	Planned Activities FY 1984
Defense Energy Emergency Preparedness Activities	Maintain and upgrade draft plan, for implementation of Defense Production Act requirements	Continue implementation of DPA, Jones Act activities, including possible rulemakings.
	Continue development of major military emergency plan including NPR, SPR, in cooperation with FEMA.	Continue major work on defense energy needs to support various scenarios including related industrial defense-related energy needs, and support for Rapid Deployment Force other defense transportation needs
	Support for the Emergency Mobilization Preparedness Board including staff support to working groups.	Continue support for EMPB including staff for working groups; DOE-wide coordination. Followup to NSDD-47 requirements.
	Plan and coordinate DOE participation in REX-82, COREX, FUELEX, other continuity of government tests and exercises.	Continue planning and coordination, as needed, of DOE participation in REX-series, FUELEX, COREX, other Defense/COG exercises.
	7 FTEs and contract support of $506 (Includes $370 of FY 1982 carryover funds.)	12 FTEs and contract support of $100

EMERGENCY OPERATIONS

	FY 1983 Approp	FY 1984 Base	FY 1984 Request
Emergency Operations	$ 935	$ 935	$ 830

The FY 1984 Budget request for Emergency Operations is $830,000, a decrease of $105,000 from the FY 1983 budget request. This level of resources provides capabilities for review and analysis of information and data relative to energy resources regarding emergencies. Defense energy emergency preparedness activities will be a priority. Readiness actions involving the National Defense Executive Reserves will continue with training and education occurring throughout the year. Resource requirements for this program are expected to remain modest. Continuity of government preparedness programs will continue and operational readiness will be maintained for the Department at defense relocation sites. Emergency Operations facilities upgrading will continue on an as needed basis with telecommunications, logistical support systems, reference materials, and automated data processing support.

Emergency Operations will continue to implement systems to coordinate communications and operations during energy emergencies, with emphasis on provision of accurate and timely information to state/local government and the general public. Such systems will include the use of interagency support agreements and Federal/state coordination mechanisms. Data support services will make use of existing governmental resources such as EIA as well as private sector resources.

Emergency Operations will provide updating and ongoing monitoring of the status of energy supplies, including assessment of defense/domestic requirements. Periodic energy risk assessment analyses will be performed as required. Electric utility system reliability will be assessed on an ongoing basis with periodic reports/studies generated by in-house staff. Ongoing petroleum and natural gas pipeline systems vulnerability assessments will continue. Further development of the "24 hour tripwire" capability for early warning and preliminary assessment of energy emergencies and assessment of likely scenarios of emergencies will also continue. Specifically the Energy Situation Reporting System will be upgraded with enhanced ADP software, backup tables, and improved formats.

Finally activities with respect to meeting Federal Power Act requirements involving electric power supply reliability will continue at the FY 1983 level. Specific levels of effort for Emergency Operations activities are projected as follows:

Emergency Operations

FY 1984 CONGRESSIONAL BUDGET

KEY ACTIVITY SUMMARY
(dollars in thousands)

Key Activity	Estimated Activities FY 1983	Planned Activities FY 1984
Emergency Operations	42 FTEs	42 FTEs
Energy Supply Adequacy and Risk Assessments	Continue initial assessments of vulnerability of electric utility network and major pipeline systems to disruption.	Continue vulnerability assessments of electric utility network and pipeline systems to disruption.
	Begin vulnerability assessment for SPR distribution system.	Continue vulnerability assessment for SPR distribution system.
	Prepare risk assessments with focus on "likely" scenarios for energy emergencies.	Continue to prepare periodic risk assessments on "likely" energy emergency scenarios.
	Respond to public inquiries on energy situation.	Respond to public queries on energy situation.
	12 FTEs	12 FTEs and $101 contract support
Emergency Executive Reserve Programs	Continue procedures to bring Reserves to operational readiness.	Complete procedures to bring Reserves to operational readiness. Design and complete tests and training to ensure readiness and viability of reserve units.
	6 FTEs	7 FTEs

Key Activity	Estimated Activities FY 1983	Planned Activities FY 1984
Energy Emergency Preparedness Operations	Develop energy emergency operations capability thru communications, ADP support, emergency public information operational procedures, national emergency relocation preparedness	Continue operations readiness activities, public information, hardware support.
	Operate emergency electronic mail system with State & Local govts and other key entities.	Continue to operate emergency electronic mail system linking DOE to state & local govt. and other key entities.
	Continue development of Continuity of Government Plans and procedures.	Continue development of Continuity of Government Plans and procedures.
	Maintain Alert Coordination System.	Continue maintenance of Alert Coordination System.
	Continue support for NEMESIS	Continue support for NEMESIS.
	10 FTEs and contract support of $226 for ADP/Telecommunications	10 FTEs and contract support of $100 for ADP/Telecommunications
Energy Situation Awareness	Continue development of 24 hour energy emergencies early warning "tripwire" including further software data base expansion.	Continue reduced development of early warning capability including data analysis thru in-house activities.
	14 FTEs and contract support of $205	13 FTEs and contract support of $125

PROGRAM DIRECTION

	FY 1983 Approp	FY 1984 Base	FY 1984 Request
Program Direction	$3,391	$3,566	$3,566

The FY 1984 budget request for Program Direction is $3,566,000, an increase of $175,000 over the FY 1983 budget request. This request provides for funding of approximately $46,000 per full time equivalent. Program direction consists of salaries/expenses and official travel for 72 FTEs, an increase of one FTE over the FY 1983 request. Funds for personnel support costs, which are estimated to be $12,000 per FTE in FY 1983 and FY 1984 are included in the planning and operations portions of the request.

Carrying out the previously described activities demands the ability to periodically assess workloads and shift project priorities in accordance with changing world conditions. This means that the Emergency Preparedness Program relies heavily on utilization of task groupings of professionals from various program elements to accomplish time sensitive complex tasks.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
FY 1984 Contract Listing
Emergency Preparedness and Energy Regulation
Emergency Preparedness
(in thousands of dollars)

Emergency Preparedness	Estimated Amount
Emergency Planning:	
o International energy security analyses	$ 248
o Econometric analyses and computer simulations of defense energy requirements under different scenarios	100
o Econometric analyses and computer simulations of economic impacts of energy supply interrruptions and certain economic response measures	126
Emergency Operations:	
o Technical analyses of vulnerability of energy supply and distribution systems	101
o Automated Information System Costs; ADP Support Services	125
o Emergency communications Support Services including DIALCOM electronic mail/telex	100
Subtotal, Emergency Preparedness	$ 800
Indirect Personnel Support Costs	864
Total, Emergency Preparedness	$1,664

DEPARTMENT OF ENERGY

FY 1984 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW

ECONOMIC REGULATORY ADMINISTRATION

In FY 1984 the goals of the programs currently administered by the Economic Regulatory Administration (ERA) will be to settle or complete the litigation of alleged violations of the Emergency Petroleum Allocation Act of 1973 (EPAA); and to authorize the import and export of natural gas and liquefied natural gas under authority of the Natural Gas Act.

It is anticipated that during FY 1983 the following objectives will have been met:

- All remaining audits of oil companies for pricing and allocation violations of the EPAA will be completed.
- All instances of suspected willful violations of the EPAA will be referred to the Department of Justice for prosecution.
- Approximately 4,000 crude oil and petroleum product import applications will be reviewed and issued.
- Final orders will be issued on approximately 10 natural gas and liquefied natural gas import applications.
- Four electricity export licenses will be authorized.
- Seven permits for facility construction will be granted.
- Twenty-five prohibition orders and 35 exemption petitions will be processed.
- Approximately 150 electric utility gas conservation plans will be approved.

During FY 1984 and the following three years, the following objectives will be met:

- Analyses will be made of contract and pricing issues related to the import and export of natural gas in a deregulated environment.
- Litigation of alleged violations of the EPAA will be completed.
- Natural Gas and Electricity Operations will continue to be at a level equivalent to FY 1983.

Accomplishment of these objectives will obtain redress for overcharges under the EPAA; facilitate efficient distribution of natural gas supplies; and allow for distribution of electricity across U.S. boundaries.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

ECONOMIC REGULATORY ADMINISTRATION - OPERATING EXPENSES
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Fuels conversion...........	$4,800	$2,000	$2,070	$ 0
Utility programs and regulatory intervention....	475	0	0	0
Compliance.................	33,600	21,000 2/	21,515 2/	7,133
Petroleum, Natural Gas		8		
and Electricity Operations...	2,792	2,518	2,580	1,145
Program Administration.....	5,765	2,148 3/	2,176 3/	3,583
Total operating expenses...	$47,432 1/	$27,666	28,341	11,861
Staffing FTP/Total FTE	677/694	374/396 4/		146/146

1/ Includes $38,200,000 reappropriated from FY 1981.
2/ Inludes $1,500,000 in funds reappropriated from FY 1982.
3/ Includes $1,500,000 in funds reappropriated from FY 1982 for severance costs.
4/ The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

Authorization:	P.L. 92-210	P.L. 94-99	P.L. 95-617	P.L. 66-280
	P.L. 93-159	P.L. 94-163	P.L. 95-619	
	P.L. 93-275	P.L. 94-385	P.L. 95-620	
	P.L. 93-319	P.L. 95-91	P.L. 95-621	

The Economic Regulatory Administration operates its programs under the authority of several sections of the aforementioned laws.

Summary of Changes

FY 1983 Appropriation enacted..................................	$27,666
Built-in increases and decreases:	
October 1982 Pay Supplemental................................	+ 675
FY 1983 Base..	$28,341
Program Increases and Decreases Economic Regulatory Administration	
o Termination of Fuels Conversion Program....................	- $ 2,070
o Completion of EPAA audit activity...........................	- 9,746
o Reductions in Caseload due to Settlements in FY 1983........	- 4,636
o Termination of Oil Import Licensing Program.................	- 797
o Decrease in Natural Gas Import Applications................	- 338
o Reduced intervention in FERC activities....................	- 300
o Decrease in administrative activities......................	- 93
o Increase in required severance funds........................	+ 1,500
FY 1984 Budget Request	$11,861

NARRATIVE JUSTIFICATION

	FY 1983 Appropriation	FY 1984 Request
Compliance........................	$21,000	$7,133

The FY 1984 budget request is $7,133,000, a decrease of $13,867,000 from the FY 1983 appropriation.

The enforcement program is responsible for the completion of government investigations of possible non-compliance by firms and individuals of the pricing and allocation regulations of the Emergency Petroleum Allocation Act of 1973 (EPAA), and the resolution of regulatory violations through negotiated settlements or litigation. These regulations were terminated by Presidential directive on January 27, 1981, but the savings clause in the EPAA provides that violations of the regulations during the control period remain subject to enforcement action. The Administration has repeatedly indicated its intention to complete this enforcement program. In FY 1984, the enforcement program will concentrate on administrative litigation of cases commenced during FY 1983 and on appeals pending at the FERC and in the federal courts of final litigation of any cases not resolved during FY 1983.

It is anticipated that by year-end FY 1983, all outstanding audits will have been completed and all instances of suspected willful violations will have been recommended for referral to the Department of Justice for prosecution. These audits and investigations, most of which involve the crude oil resale industry, have encountered substantial delays due to the resistence by certain firms in providing access to information necessary to the conduct of the audits. As a result of the Department's recent success in securing court enforcement of several subpoena actions, the remaining audit and investigation work is expected to be completed by September 30, 1983. Following completion of the remaining audits, enforcement actions will be initiated to recover the funds from firms found to have overcharged the public in the sale of crude oil or refined petroleum products. Normally, these cases are brought as administrative actions and are adjudicated in the first instance by DOE's Office of Hearings and Appeals (OHA). If OHA determines that a violation did occur, it issues a final Remedial Order, from which an appeal may be taken, first to the Federal Energy Regulatory Commission (FERC), secondly to a federal district court, and thereafter to the Temporary Emergency Court of Appeals. This lengthy review process is required by the provisions of the DOE Organization Act of 1977.

ERA attempts, wherever possible, to settle civil overcharge cases by means of consent settlements. Of the 34 major refiner audits where violations were alleged, all but two or three are expected to be settled by the end of FY 1983. Similarly, ERA has succeeded in negotiating consent settlements with a large percentage of firms that are not major refiners and will continue this effort during FY 1983. Because it is not possible to predict the number of future settlements and because of the non-uniform duration of OHA enforcement cases, it is not possible to ascertain the number of cases that will remain in a litigation posture during FY 1984. Based on past experience, however, it is estimated that at least 70 cases will be in some phase of litigation (OHA, FERC or the federal courts) during FY 1984 and will require staffing by experienced attorneys and support personnel. The cases that are likely to be litigated will involve complex factual and legal issues requiring the active participation of litigation teams, rather than merely a single attorney. Several cases will be decided only after protracted evidentiary hearings based on voluminous data, complex mathematical calculations and presentation of substantial legal analyses.

The Compliance workload will require 120 full-time equivalent positions, of which 106 are to be used for litigation activities. The remaining 14 will be used for enforcement orders, support for special investigations, FOI requests and settlements and vertifications.

FY 1984 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATORY ADMINISTRATION

Compliance

Key Activity Summary

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Settlement/Litigation	Complete issuance of enforcement orders; pursue litigation of appropriate cases.	Complete litigation of all unsettled cases. Not more than 250 cases are expected to carry-over into FY 1984.
Special Investigations	Complete recommended referral of cases to DOJ Criminal Division and provide support for such cases.	Provide continued support to DOJ
FOI and Other Requests	Provide responses to approximately 600 information requests.	Provide responses to approximately 200 information requests.

NARRATIVE JUSTIFICATION

	FY 1983 Appropriation	FY 1984 Request
Fuels Conversion......................	$2,000	- 0 -

No funding is requested in the FY 1984 budget for the Fuels Conversion Program. The program was continued in FY 1983 to complete its assistance to electric utilities which voluntarily sought to convert existing powerplants from oil or gas to coal burning and to grant exemptions from the statutory prohibitions on oil and gas use by utility and industrial facilities.

During FY 1983, DOE continued processing conversion orders requested by utilities pursuant to the Powerplant and Industrial Fuel Use Act (FUA) and granted approximately 35 exemptions. Over 150 utility natural gas conservation plans were processed. No funding is requested for FY 1984 since the budget assumes work on this program will then be substantially completed.

Under the Public Utility Regulatory Policies Act (PURPA), gas and electric utilities covered by the Act were identified and progress on rate reform initiatives by state regulatory commissions and nonregulated utilities was reported to the Congress. Consideration of the PURPA ratemaking and regulatory policy standards has been substantially completed and this program should also be terminated by the end of FY 1983.

FY 1984 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATORY ADMINISTRATION

FUELS CONVERSION

Key Activity Summary

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Utility Conversions	Process 25 orders	Program terminated.
FUA Facilities Exemptions	Receive and finalize 35 petitions.	Program terminated.
Utility Conservations	Review and approve 155 utility conservation plans.	Program terminated.
PURPA	Prepare and publish list of covered utilities and report to Congress on rate reform initiatives.	Program terminated.

NARRATIVE JUSTIFICATION

	FY 1983 Appropriation	FY 1984 Request
Petroleum, Natural Gas, and Electricity Operations	$2,518	$1,145

The FY 1984 budget request is $1,145,000, a decrease of $1,373,000 from the amount appropriated in FY 1983.

The Petroleum, Natural Gas, and Electricity Operations funding request provides for the Natural Gas Import/Export Program and the Electricity Import/Export Program. The goals of these activities are to ensure that natural gas imports are in the national and public interest; to facilitate the removal of unnecessary regulatory barriers to the efficient and equitable distribution of natural gas supplies; to authorize the export of electricity and the construction and operation of transmission facilities at international borders; and to simplify and reduce the burden of regulation.

The Natural Gas activity is authorized by Section 3 of the Natural Gas Act, Titles III and IV of the Natural Gas Policy Act, and Sections 402, 403, and 405 of the DOE Organization Act. Applications to import and export natural gas and liquefied natural gas are processed; curtailment priorities for interstate pipeline companies are established; and rules are proposed to the Federal Energy Regulatory Commission to facilitate efficient distribution of natural gas supplies and to aid in displacing imported fuel oil. By authorizing imports and exports of natural gas, where appropriate, adequate secure supplies will be ensured to supplement domestic supplies at an economic price. Appropriate consideration will be given to the interaction among natural gas wellhead price deregulation, imports and the domestic natural gas distribution system.

In FY 1983, the agency completed analyses and issued orders on ten import applications. An additional ten applications received in FY 1983 will carry over into FY 1984. The agency provided technical support for consultations with the Canadians on natural gas trade and market problems.

In FY 1984, the number of import applications should decrease because the Canadian government's resolution of its export policy in FY 1983 will permit the completion of pending applications. While a decline in the number of contract and pricing issues is anticipated, the effects of natural gas decontrol on the market will increase the complexity of the analyses as well as the cases. This workload will necessitate 15 full-time equivalent positions.

The Electricity Import/Export activity is authorized by Section 202(e) and (f) of the Federal Power Act and Executive Order 10485. Applications to export electricity are assessed for impact on domestic electric power system reliability and facility permit applications are reviewed for environmental and system reliability consequences. During FY 1983, four electricity exports were authorized and seven permits for facility construction were processed. This level of activity is expected to continue in FY 1984.

No funds are requested for oil import licensing, under authority of the Trade Expansion Act of 1962 and Presidential Proclamation 3279, since the program has outlived its usefulness. No import fees are applicable and its termination will further reduce the regulatory burden imposed on the petroleum importing industry.

FY 1984 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATORY ADMINISTRATION

PETROLEUM, NATURAL GAS, AND ELECTRICITY OPERATIONS

KEY ACTIVITY SUMMARY

Key Activity	Estimated Activities During FY 1983	Planned Activities During FY 1984
Oil Imports	Measure and track oil imports through the issuance of import licenses; approximately 4000 applications anticipated.	Program Terminated.
Natural Gas Program	Process 65 import/export applications, provide technical support for Canadian consultation; participate in FERC proceedings.	Process 60 import/export applications; perform economic and other analyses; participate in FERC proceedings.
Electricity	Process four electricity exports and seven facility construction permits.	Process four electricity export and seven facility construction permits.

NARRATIVE JUSTIFICATION

	FY 1983 Appropriation	FY 1984 Request
Program Administration.........	$2,148	$3,583

The FY 1984 budget request is $3,583,000, a $1,435,000 increase from that appropriated in FY 1983. Administrative activities will continue to decrease in FY 1984 in relation to continuing decreases in programmatic functions. Of the amount requested, $3,000,000 is designated for costs associated with reductions in ERA program activities from the FY 1983 levels. $583,000 is earmarked for Program Administration payroll and related costs. Objectives of this activity are to:

- o Assure effective management and direction of programs administered by the Economic Regulatory Administration (ERA), and
- o Provide financial management, procurement, personnel, and manpower control; program analyses, evaluation and coordination; public information; and other general management activities.

This activity is responsible for providing direct management assistance and administrative support to all ERA programs. It provides management oversight of procurement activities and the expenditure of funds, assists programs in executing their independent program planning activities, and coordinates programs and activities which cut across organizational lines. It also provides correspondence control and assignment tracking.

In FY 1984, this activity will provide direction and centralized management services to maintain and process personnel related documents monitor and allot funds, and control Congressional and public correspondence. In addition, the program will manage an extensive phasedown of program staffs. This workload will require 11 full-time equivalent positions.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
Program Overview
Office of Hearings and Appeals

The goal of the Office is to assure the lawful and equitable operation of the DOE programs by expeditiously processing and resolving petitions for regulatory or other relief and conducting adjudicatory proceedings. The Office is responsible for all of the Department's adjudicatory processes--other than those administered by the Federal Energy Regulatory Commission or the Board of Contract Appeals--and therefore reviews and decides exception applications from individual firms or persons who believe that a DOE-issued rule, regulation, or order causes a serious hardship, gross inequity, or an unfair distribution of burdens. The Office is also responsible for deciding final appeals in adjudicatory matters under the jurisdiction of the Secretary and for providing an adjudicatory forum in enforcement matters to consider contested issues of fact or law prior to the issuance of a Remedial Order.

FY 1983 projected accomplishments include:

- Resolve 729 compliance and related cases and 270 non-compliance filings.
- Formulate and implement procedures and standards governing applications relating to overcharge refund proceedings.
- Process refund applications which will result in refunds totaling $100,000,000 to aggrieved parties.
- Maintain a productivity rate of 1.1 resolutions per month per staff member.

Specific objectives for FY 1984 to FY 1987, formulated in response to Public Laws are:

- Based upon anticipated completion of ERA compliance and enforcement activities OHA's goal is to resolve by the end of FY 1986 virtually all compliance and related cases expected to be received by the end of FY 1983.
- Resolve annually the estimated 300 to 500 non-compliance case filings which OHA expects to continue to receive. These filings pertain to the Freedom of Information Act, information requirements of the Energy Information Administration, and petitions for private grievance or redress. The bulk of these submissions are subject to processing time limitations and other regulatory requirements which mean that these submissions must be adjudicated on a priority basis.

Accomplishment of these specific objectives will help meet the objectives of pertinent public laws; provide for the timely termination of matters pertaining to the prior DOE regulatory programs; and provide for the resolution of issues of the most complex nature, involving large sums of money, and which involve the diverse interests of energy producers, consumers, the U.S. government and other governmental entities.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Office of Hearings and Appeals - Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Total				
Operating Expense	$4,800	$5,250	$5,275	$5,500
Staffing FTP/ Total FTE's	72/88	119/124*		110/115

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* The FTE's shown represent the current authorization. Manpower will be reassessed to determine the number of full-time equivalents required to implement this program in FY 1983. It is estimated that the funding level shown will support approximately 105 full-time permanent staff years.

AUTHORIZATIONS: Sections 503, 504(a), P.L. 95-91; Section 21, P.L. 93-275; Section 104, P.L. 94-385; Section 5, P.L. 93-159; Section 207, P.L. 92-210; P.L. 89-554; P.L. 93-579.

SUMMARY OF CHANGES
(dollars in thousands)

FY 1983 Appropriation/FY 1984 Base	$5,250
Built in increases and decreases:	
Effect of 1982 pay raise not absorbed by administrative action	+ 25
FY 1984 base	5,275
Program increases and decreases:	
Additional staff years of effort	+ 225
1984 Budget Request	$5,500

Department of Energy

FY 1984 CONGRESSIONAL BUDGET REQUEST

Office of Hearings and Appeals

The FY 1984 budget request is for $5,500,000 which represents a $250,000 increase over the amount appropriated for FY 1983. The requested funding will provide for salaries and support for 110 full-time and 5 other than full-time staff year equivalents, reflecting a decrease of 9 full-time staff currently authorized for FY 1983.

The bulk of the Office of Hearings and Appeals' case load is directly related to the Economic Regulatory Administration's compliance program. OHA anticipates receiving approximately 1,000 new enforcement and related petitions in FY 1983 and approximately 200 enforcement related case filings in FY 1984. In addition, OHA anticipates receiving between 300 and 500 non-compliance related cases during FY 1984. Thereafter, OHA anticipates receiving between 300 and 500 new petitions each fiscal year involving the Freedom of Information Act, information requirements of the Energy Information Administration, and requests for private grievance or redress. Utilizing OHA's most recent productivity experience to take into account the highly complex issues and factual material presented in the adjudicatory compliance proceedings generally being conducted after decontrol, OHA projects case resolutions of 999 in the 1983 fiscal year and 924 in the 1984 fiscal year. As contrasted with its actual closing inventory of 522 petitions at 1982 fiscal year end, OHA therefore would complete FY 1983 and 1984 with inventories of 823 and 399 open cases, respectively. Approval of the requested funding is necessary if OHA is to meet its goal of terminating the prior DOE regulatory programs by the end of FY 1986. In addition, OHA could continue to resolve the estimated 300 to 500 non-compliance petitions which current projections indicate it will continue to receive each fiscal year and which generally must be adjudicated on a priority basis.

Department of Energy
FY 1984 CONGRESSIONAL BUDGET REQUEST

Key Activity Summary

Office of Hearings and Appeals

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Compliance and related filings.	At October 1, 1982, OHA had approximately 450 compliance and related cases in inventory. Using ERA projections OHA expects to receive approximately 1000 new filings in FY 1983. On the basis of regulatory processing requirements and average actual productivity rates, OHA expects to resolve 729 compliance and related cases during FY 1983 and have an inventory of 721 unresolved compliance petitions on hand at fiscal year end.	Using ERA projections, OHA expects to receive 100-200 cases related to compliance actions initiated during prior periods in FY 1983. With the requested funding and staffing, 563 petitions should be resolved leaving 358 open compliance and related filings at the end of FY 1984.
Non-complaince filings.	At October 1, 1982, approximately 72 non-compliance cases were on hand and new receipts are projected to average between 300 and 500 per fiscal year. For planning purposes, 300 such receipts are projected for FY 1983, 270 of which are projected to be resolved during the year due to priority processing requirements. Thus approximately 102 of these petitions would remain in inventory at the end of FY 1983.	An estimated 300 non-compliance cases are projected for FY 1984, all except 41 of which would be resolved during the fiscal year.

DEPARTMENT OF ENERGY
FY 1984 CONGRESSIONAL BUDGET REQUEST
FY 1984 CONTRACT LISTING
ENERGY REGULATION
(in thousands of dollars)

	Estimated Amount
Economic Regulatory Administration	
Petroleum, Natural Gas, and Electricty Operations	
Preparation of environmental impact statements for proposed transmission facilities crossing international borders	$ 250
Office of Hearings and Appeals	
Publication, by the Commerce Clearinghouse, of Presidential Decision and Orders	$ 250

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Energy Information Administration

For necessary expenses in carrying out the activities of the Energy Information Administration,[$50,800,000], $50,800,000 to remain available until expended.

Explanation of Change

Proposed language will provide no-year funding for this account.

DEPARTMENT OF ENERGY
CONSOLIDATED SCHEDULE OF PERMANENT POSITIONS

ENERGY INFORMATION ACTIVITIES

DETAIL OF PERMANENT POSITIONS

	1982 ACTUAL	1983 ESTIMATED	1984 ESTIMATED
EXECUTIVE LEVEL I			
EXECUTIVE LEVEL II			
EXECUTIVE LEVEL III			
EXECUTIVE LEVEL IV	1	1	1
EXECUTIVE LEVEL V			
SUBTOTAL	1	1	1
ES-6	1	1	1
ES-5	4	3	3
ES-4	6	4	4
ES-3	5	2	2
ES-2	4	4	4
ES-1	4	3	3
SUBTOTAL	24	17.	17
GS-18			
GS-17			
GS-16			
GS/GM-15	51	48	48
GS/GM-14	89	67	68
GS/GM-13	88	78	79
GS-12	71	60	61
GS-11	37	47	48
GS-10	1		1
GS-9	37	37	37
GS-8	15	18	18
GS-7	41	37	38
GS-6	14	15	16
GS-5	16	17	17
GS-4	4	5	5
GS-3	3	3	3
GS-2			
GS-1			
SUBTOTAL	467	432	439
UNGRADED			
TOTAL PERMANENT POSITIONS	492	450	457
UNFILLED POSITIONS, END OF YEAR	9		
TOTAL PERMANENT EMPLOYMENT, END OF YEAR	483	450	457

DEPARTMENT OF ENERGY

FISCAL YEAR 1984 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY INFORMATION ACTIVITIES

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1982 Actual	FY 1983 Estimate	FY 1984 Request
Collection, Production and Analysis	43,974	33,203	32,480
Program Services	18,576	11,828	11,655
Policy and Management	7,983	6,315	6,665
Subtotal	70,533	51,346	50,800
Less: Proposed Pay Raise Supplemental	—	-946	—
Total, Energy Information Activities	70,533	50,400	50,800

FY 1984 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Energy Information
Energy Information Administration
(In thousands of dollars)

	FY 1983*	FY 1984
Appropriation*	$50,400	$50,800
Budget authority..................................	50,400	50,800
Receipts and reimbursements (other than DOE)		
Unobligated balances, start of the year...........	-	-
Unobligated balances, end of the year.............	-	-
Offsetting receipts (other DOE organizations)		
FERC	6,000	6,000
Total, transfer estimates	6,000	6,000
Total, obligations..............................	$56,400	$56,800

* Comparative transfer in FY 1983. Real transfer in FY 1984.

For purposes of comparability with the FY 1984 request, $6,000,000 is shown as an offsetting receipt; the FY 1983 appropriation is $56,400,000.

DEPARTMENT OF ENERGY

FY 1984 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Energy Information

The mission of the Energy Information Administration (EIA) is to produce and provide meaningful, timely, objective, and accurate energy information to the Executive Branch, Congress, State governments, industry, and the public so that those who make decisions about energy in all sections of the society have the tools to make those decisions well. In order to accomplish this, EIA collects, processes, and interprets energy data and exercises independent judgment in the gathering, analysis, and dissemination of information. In support of this mission, EIA plans to remain the pre-eminent source of national energy statistics, and objective energy analyses, providing the reference standard for energy information.

This budget reflects continuation of virtually all basic energy information programs and activities carried out during FY 1983. Consequently, the budget assumes passage of the "Energy Information Administration Amendments of 1981" or similar legislation and contains no funds to carry out the activities which would no longer be required upon passage of this legislation. Additionally, this budget contains no funds to prepare mid- and long-term forecasts, and at the budgeted level, many quality maintenance activities would be deferred for the second year in a row.

This budget also reflects the transfer of the Federal Energy Regulatory Commission (FERC) budget of the request for resources to perform information support activities in support of FERC's mission. In FY 1984 these activities are estimated to cost $6 million, and will be performed for FERC on a reimbursable basis. The full amount of these funds are needed to maintain the fixed cost of operating the automated data processing (ADP) facility and multi-purpose surveys, in fulfillment of EIA's multi-faceted mission.

FY 1983 accomplishments include:

- Operated basic energy data collection programs to provide timely, integrated, and accessible data.
- Prepared short-term supply forecasts for primary energy supply sources and demand sectors.
- Provided basic support to the FERC to allow its regulatory functions to be sustained.
- Completed the redesign of the Petroleum Marketing Information System to convert largely regulatory data collections to more efficient, less costly, and less burdensome statistical collections.
- Maintained short-term models and other analysis tools.
- Produced and published Short-Term Energy Outlook quarterly.
- Produced and published an Oil and Gas Reserves report.
- Produce the Monthly Energy Review, EIA's most widely distributed publication.
- Completed review of oil and gas production reporting systems for eleven major producing States begun in FY 1981.
- Assessed the quality of oil and gas data submitted by oil and gas well operators to EIA for calendar year 1980.

- Provided direct informational and analytical support to the Secretary, the White House, the FERC, and Congress during the natural gas deregulation debate.

- Completed analytical support for FERC "Near Deep" rulemaking which was begun in FY 1982.

- Established an integrated data base and system for access and use of natural gas information, which was begun in FY 1982.

- Redesigned and consolidated publications to reduce costs, to improve the presentation of statistical series, and to make it easier for users to find the information they need. Major efforts include: the Electric Power Annual, replacing 2 previous annuals; the Petroleum Supply Annual, replacing 4 previous annuals; the International Energy Annual, replacing 3 previous annuals; and four coal and coke reports, replacing 10 previous reports. This was begun in 1982.

- Prepared the Department of Energy (DOE) Information Collection Budget.

- Managed the DOE Forms Clearance and Burden Control program.

- Completed the Data Resources Directory.

- Completed revision of Monthly Power Plant Report.

- Completed a pilot study of electronic data transfer for collection of electric power data.

- Completed implementation of the Intermediate Future Forecasting System (IFFS).

- Published a series of statistical reports on residential energy consumption and non-residential buildings energy consumption. Conducted and planned residential and commercial surveys to collect future years' data.

- Published "Annual Energy Price and Expenditures Reports."

- Provided responses to only high priority public inquiries requesting information about energy.

- Completed and implemented standards which were developed in FY 1982.

- Established an automated, integrated international energy data base.

Specific objectives for FY 1984 to FY 1988 are:

- Continue to produce and distribute the EIA family of energy information products on schedule.

- Continue managing the forms clearance process and preparing the Department's Information Collection Budget.

- Operate EIA basic data collection programs to result in timely, integrated, and accessible data.

- Perform planned timely analyses of relevant energy issues, including the preparation of short- and intermediate-range energy projections.

- Meet standards for providing timely and responsive computer services.

- Provide basic support to the FERC on a reimbursable basis to allow its regulatory functions to be sustained.

- Provide a greater degree of confidentiality for business-submitted information needed for statistical purposes which will improve efficiencies and reduce respondent burden by allowing greater access to other statistical agencies' data as proposed in the "Energy Information Administration Amendments of 1981."

- Provide the Executive Branch, Congress, State Governments, industry, and public access to the National Energy Information System and respond to requests from the White House, Congress, and other Federal agencies for special reports.

- Continue to manage EIA programs efficiently, maintaining its exemplary reputation, with minimum overhead.

Energy Information Administration
Energy Information

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982* Appropriation	FY 1983* Appropriation	FY 1984* Base	FY 1984** Request
Collection, production, and analysis				
Operating expenses				
Oil and gas.................	14,059	10,825	10,825	10,825
Coal, nuclear, electric, and alternate fuels............	4,925	4,030	4,030	4,030
Energy markets and end use..	7,205	2,830	2,830	1,230
Program direction...........	17,785	14,760	15,518	16,395
Subtotal................	43,974	32,445	33,203	32,480
Total, Collection, production, and analysis...............	43,974	32,445	33,203	32,480
Staffing FTP/FTE	389/402	367/391		374/391

* Comparable. Reflects comparative transfer of FERC support to FERC.
** Reflects real transfer of FERC support to FERC.

Authorization: P.L.'s 75-688, 93-275, 93-319, 94-163, 94-385, 95-619, 95-620, 95-621, 96-294, 96-229, and 16 U.S.C. 791a *et. seq.*

Summary of Changes

FY 1983 Appropriation enacted, comparable..........	$32,445
o FY 1983 Pay Raise............................	+ 758
FY 1984 Base......................................	$33,203
Program Increases and Decreases:	
Energy Markets and End Use	
o Elimination of residential and commercial consumption surveys; ($1,600)	- 1,600
Program Direction:	
o Impact in 1984 of within grade increases and other salary and expenses increases............	+ 877
FY 1984 Budget Request......................	$32,480

The programs in the Collection, Production, and Analysis consolidated decision unit are organized into three offices: The Office of Oil and Gas, the Office of Coal, Nuclear, Electric, and Alternate Fuels, and the Office of Energy Markets and End Use. These programs are responsible for the design, development, and maintenance of oil, gas, coal, nuclear, electric, alternate fuels and energy consumption, statistical and forecasting information systems. The information produced by these systems enables the Energy Information Administration to exercise independent judgment in the gathering, interpretation and dissemination of energy related information. These programs also provide basic energy information services to support the FERC which will be funded on a reimbursable basis beginning in FY 1984. The FY 1984 request for these programs is $32,480,000 and 391 full-time equivalent (FTE) staff years.

The Office of Oil and Gas maintains oil and gas statistical and analytical information systems. It performs data collection and processing, quality control, analysis, and report preparation activities related to oil and gas. The FY 1984 request for Oil and Gas is $10,825,000 and 179 FTE staff years.

The petroleum supply program produces petroleum and petroleum product supply statistics and other information which is published in the Weekly Petroleum Status Report, the Petroleum Supply Monthly, and the Petroleum Supply Annual, and in several EIA integrated information products. Information systems related to petroleum and petroleum product supplies, prices, and potential petroleum supply disruption will be maintained. EIA will continue to monitor and interpret trends in petroleum supply based on available data from all sources.

The petroleum marketing program produces information used in numerous EIA integrative reports and published in the Petroleum Sales Monthly. This request contains sufficient funds to continue systems initiated in FY 1982 which monitor petroleum product prices, supply, and distribution as mandated by P.L. 97-229.

The natural gas program combines ongoing natural gas supply and price information activities with support to meet the regulatory functions of the FERC. This funding allows the natural gas program to produce the Natural Gas Annual, the Natural Gas Monthly, Gas Supplies of Interstate Natural Gas Pipeline Companies, and Statistics of Interstates Natural Gas Pipelines. Support to the FERC will be funded on a reimbursable basis in 1984. No funds are included in this request to support FERC. EIA will continue to monitor and interpret natural gas supply and pricing trends and prepare forecasts for the use of Federal and private industry decisionmakers.

The reserves and data consolidation program gathers annual information concerning oil and gas proved reserves and production and publishes the results in the U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Annual Report. The annual production and reserves data will be used to study trends in crude oil and natural gas production, drilling activity, and foreign production potential.

The Office of Coal, Nuclear, Electric, and Alternate Fuels develops, operates, and maintains the statistical and analytical information systems necessary to collect, process, and interpret data and conduct analysis and short-term forecasting activities in the respective fuel areas, and provides regulatory support to the FERC. These activities result in the production of statistical periodicals, technical reports, and analysis reports. The FY 1984 request for the Office of the Coal, Nuclear, Electric, and Alternate Fuels in $4,030,000 and 122 full-time equivalent staff years.

This level of funding will enable the coal program to continue most basic publications. The National Coal Model will continue to be maintained as the major tool for conducting analyses. Additionally, a Coal Strike Monitoring System will be established to provide timely information to decisionmakers in the event of a coal strike with the expiration of the United Mine Workers contract in October, 1984.

The electric power program produces statistics and other information necessary for the publication of monthly, quarterly, and annual reports; provides timely and pertinent electric power data and interpretation; maintains the continuity of historical data, and provides support to the FERC in conducting their regulatory activities in the field of electric power. No funding is requested to support FERC activities in FY 1984. These activities will be funded on a reimbursable basis by FERC. This level of funding will provide for the continuation of publications such as Cost and Quality of Fuels for Electric Utility Plants (monthly and annual), the Electric Power Monthly, the Electric Power Annual, the Inventory of Power Plants in the United States, and other recurring reports dealing with electric power rates, typical electric bills, construction costs, operating income and revenue, and licensing.

The nuclear and alternate fuels program produces basic nuclear and alternate fuels statistics and information necessary for the publication of periodic timely analyses relevant to the issues under consideration by decisionmakers. This funding level will provide for the continuation of most basic historical data series, including three uranium data collections assumed from the Assistant Secretary for Nuclear Energy in September 1981.

The Office of Energy Markets and End Use maintains energy statistical and analytical information systems concerning energy consumption, and other subjects which cut across different energy sectors. This information is provided by data collection and processing, analyses and projections associated with energy end use, price, supply and demand balances, and economics, international, and financial matters. The 1984 request for Energy Markets and End Use is $1,230,000 and 90 full-time equivalent positions.

The Office of Energy Markets and End Use will continue to produce a report annually which contains a summary of agency activities, a compendium of energy statistics, and an integrated forecast of energy consumption, production, and prices, through the end of this decade.

Other regularly scheduled reports to be published include the Short-Term Energy Outlook and the Monthly Energy Review. The Short-Term Energy Outlook contains quarterly projections of U.S. energy production, consumption, and prices for up to 18 months giving decisionmakers and policymakers a range of possible results for various scenarios relevant to near-term issues. The Monthly Energy Review presents key energy statistics on a monthly basis. Other reports to be prepared will cover topics such as characteristics of energy use, world supply and demand statistics for primary energy, and various multi-fuel and financial reports.

The capability to provide forecasts through the end of the decade will be provided through the use of the Intermediate Future Forecasting System (IFFS).

International statistics will be included in the International Energy Annual, and the Monthly Energy Review. These activities will provide the tools for developing an international contingency plan to be used the event of a supply disruption.

This request would enable the Office of Energy Markets and End Use to continue the activities conducted in FY 1983 with the exception of the consumption survey. Program direction provides salaries, benefits, and travel funds for staff involved in the above activities.

The 1984 request for program direction is $16,395,000, which will provide salaries, benefits, and travel for 391 full-time equivalent staff who conduct the activities described in the Collection, Production, and Analysis decision unit. The increase over FY 1983 is necessary to fund within grade increases and other salary and expenses.

The FY 1983 House Appropriations Committee report (no. 97-942, to accompany H.R. 7356, page 107) states that "The fiscal year 1984 budget justification should also list the statutory requirements for which no funds are requested with the amounts that would be required if the statutory requirements were to be accomplished." In accordance with the requirement, the following information is provided:

Activity	Legal Citation	Amount Required
Financial Reporting System	Section 205(h) of P.L. 95-91	$2,400,000 and 10 staff years
Mid- and Long-term models and forecasts	Section 57(a)(2) of P.L. 93-275	$4,300,000 and 60 staff years
Quarterly Report to Congress	Section 11(c)(2) of P.L. 93-319	$50,000 and 1 staff year
Coal Reserves Disclosure	Section 801 of P.L. 95-620	$50,000 and 1 staff year

Proposals for elimination of these programs were contained in the "Energy Information Administration Amendments of 1981" (S. 1281), and the "Congressional Reports Elimination Act" (H.R. 6005), and accompanying materials.

The reporting requirements of P.L. 96-102, the Emergency Energy Conservation Act, are not included here because that provision of the law expires during FY 1983.

Anticipated Workload - Collection, Production, and Analysis

	FY 1982	FY 1983	FY 1984
Oil and Gas - DOE			
Data gathering systems maintained	51	49	47
Models maintained	6	4	3
Data reports prepared	259	244	228
Analyses and interpretive reports prepared	64	61	63
Projections prepared	30	30	30
Oil and Gas - Support to FERC			
Data gathering systems maintained	13	13	13
Models maintained	1	1	1
Data reports prepared	52	52	28
Analyses and interpretive reports prepared	5	4	4
Coal, Nuclear, Electric, and Alternate Fuels - DOE			
Data gathering systems maintained	21	18	18
Models maintained	14	12	12
Data reports prepared	20	18	18
Analyses and interpretive reports prepared	16	16	12
Projections prepared	5	5	5
Coal, Nuclear, Electric, and Alternate Fuels - Support to FERC			
Data gathering systems maintained	5	5	5
Data reports prepared	2	2	2
Analyses and interpretive reports prepared	3	3	3
Energy Markets and End Use - DOE			
Data gathering systems maintained	9	3	2
Models maintained	14	6	6
Data reports prepared	13	13	8
Analyses and interpretive reports prepared	12	7	8
Projections prepared	8	5	5

* Workload indicators do not take into account varying complexity factors; therefore, units of measurement are not necessarily comparable. For example, the Oil and Gas Reserves System is much larger, involving many more respondents and generating more data than the Coke Plants system. Each counts as one system.

Personnel Resources

The FY 1984 request for Collection, Production, and Analysis include funds to support 391 full-time equivalent staff years.

	FY 1982	FY 1983	FY 1984
Oil and Gas	178	179	179
Coal, Nuclear, Electric, and Alternate Fuels	110	122	122
Energy Markets and End Use	114	90	90
Total, Collection, Production, and Analysis	402	391	391

The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

FY 1984 Congressional Budget Request

Collection, Production, and Analysis
Oil and Gas

KEY ACTIVITIES	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Petroleum Supply Data	Conduct weekly, monthly, and annual surveys; and produce reports	FY 1983 activities continued.
Petroleum Data Analysis and Projections	Conduct petroleum supply data and trend analysis, prepare short- and intermediate-term crude oil and product forecasts. Eliminate mid- and long-term forecasts.	Continue basic short- and intermediate-term petroleum supply data and trend analysis and projections.
Petroleum Price Data	Operate existing petroleum product price systems, implement a consolidated system.	Conduct consolidated system.
Natural Gas Supply and Marketing Data	Conduct natural gas monthly and annual statistical surveys, provide basic existing data support to FERC, and conduct systems and publications review and modification.	Implement consolidated natural gas monthly annual reports. Provide basic support to FERC on a reimbursable basis.
Natural Gas Data Analysis and Projections	Conduct natural gas supply data and trend analysis, prepare short- and intermediate-term natural gas forecasts. Eliminate mid- and long-term natural gas forecasts	Continue basic short- and intermediate-term natural gas supply data and trend analysis
Oil and Gas Reserves and Production	Conduct an annual survey of oil and gas reserves and production, prepare a report, and maintain the universe list.	FY 1983 activities continued.
Oil and Gas Data Review, Analysis, and Consolidation	Interpret oil and gas reserves data, develop operator and field tests, and operate oil and gas surveillance fields system.	FY 1983 activities continued.

FY 1984 Congressional Budget Request

Collection, Production, and Analysis
Coal, Nuclear, Electric, and Alternate Fuels

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
Produce periodic reports on coal production, consumption, supply.	Continue production of basic coal publications limiting projections to the short- and intermediate-term.	Continue production basic coal publications limiting projections to the short- and intermediate-term
Produce periodic reports on electric utilities generating capacity, production, and demand.	Produce annual, monthly, and quarterly reports on electric power; provide support to FERC; automate publications. Electric supply projections will be limited to short- and intermediate-term.	Continue to produce electric utility statistics and short- and intermediate-term projections. Provide support to FERC on a reimbursable basis.
Produce periodic and special reports on nuclear energy supplies.	Produce annual reports on nuclear power and nuclear fuel cycle supply, costs, and Executive requests for special studies. Conduct special studies of current and emergent issues.	Continue periodic reports but initiate no new special studies except for high-level Congressional or Executive requests.
Collection of data and production of periodic reports on alternate fuels.	Collect data on solar energy, wood, alcohol use, but at reduced levels from previous year; produce periodic reports on alternate fuels use but no more frequently than annually.	Collect data and produce reports as appropriate.

FY 1984 Congressional Budget Request

Collection, Production, and Analysis
Energy Markets and End Use

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1983	PLANNED ACTIVITIES DURING FY 1984
End Use Consumption	The Residential Energy Consumption Survey will be conducted and reports prepared. The Commercial Energy Consumption Reports will be published	Various sector reports will be prepared based on past years' surveys
Short-Term Forecasting Activities	The Short-Term Integrated Forecasting System and international data and forecasts will be maintained. The Short-Term Energy Outlook which contains projections of U.S. energy production, consumption, and prices will be published quarterly.	The Short-Term Energy Outlook will continue to be published.
Integrative Reports	Integrative reports, such as the Monthly Energy Review, the State Energy Data Report, the Energy Expenditure Report, and an annual report with intermediate forecasts will produced.	Integrative reports involving historical data and short- and intermediate-term projections will be maintained.
Energy Emergency Management Information Program	Program eliminated as a separate system. Basic information programs needed for monitoring energy trends for emergency preparedness purposes will continue.	Basic information programs needed for monitoring energy trends for emergency preparedness purposes will continue.
Financial Reporting System	The report will be produced for 1981 data.	Eliminated.

Energy Information Administration
Energy Information

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1982* Appropriation	FY 1983* Appropriation	FY 1984* Base	FY 1984** Request
Program Services				
Operating Expenses				
Information Management Services	$12,252	$ 8,525	$ 8,525	$ 8,225
NEIC	817	750	750	750
Statistical Standards	2,422	248	248	248
Program Direction	3,085	2,189	2,305	2,432
Subtotal	18,576	11,712	11,828	11,655
Total, Program Services	$18,576	$11,712	$11,828	$11,655
Staffing FTP/FTE	86/95	53/58		53/58

* Comparable. Reflects comparative transfer of FERC support to FERC.
** Reflects real transfer of FERC support to FERC.

Authorization: P.L.'s 75-688, 93-275, 93-319, 94-163, 94-385, 95-619, 95-620, 95-621, 96-294, 97-229, and 16 U.S.C. 791a et. seq.

Summary of Changes

FY 1983 Appropriation enacted	$11,712
o FY 1983 Pay raise	+ 116
FY 1984 Base	$11,828
Program Increases and Decreases:	
Information Management Services	
o Reduction in computer support for consumption surveys	- 300
Program Direction	
o Impact in 1984 of within grade increases and other salary and expenses increases	+ 127
FY 1984 Budget Request	$11,655

Program Services consists of three programs: Information Management Services, the National Energy Information Center, and Statistical Standards. These programs support the information collection, production and analysis functions of EIA by providing computer processing support services, preparation and dissemination of information and response to public inquiries, survey design, including sampling and estimation, and development of standards in the areas of data collection, processing, and reporting, development of processing and documentation standards, and the standardization of definitions.

Information Management Services provides computer processing support services for EIA information programs and for FERC regulatory programs. This office operates a major computer facility consisting of a large-scale multi-processor computer, a nation-wide telecommunications network, and systems software programs providing high level computer languages, data base management systems, and modeling, simulation, statistical processing, text editing, table processing and graphics packages. This major data processing complex is accessible to users through a data communications network operating seven days a week, consisting of many computer terminals and remote job entry stations.

The FY 1984 request for Information Management Services is $8,225,000 and 12 FTE staff years. At this level the core processing capability will be maintained and the FY 1983 level of effort will be sustained. This level will support the same level of computer utilization, training, and technical support, and terminal availability as in FY 1983. This level does not provide funding for computer resources for FERC, which will be provided on a reimbursable basis beginning in FY 1984.

The National Energy Information Center performs final editorial and graphics preparation and public dissemination activities for all EIA information products. These activities are conducted to disseminate data publications, interpretive analysis reports, information directories, and public use tapes and microfiche. Dissemination also includes response to public inquiries. The FY 1984 request for the National Energy Information Center is $750,000 and 21 FTE staff years. This funding level is the same as FY 1983. At this funding level, the National Energy Information Center will maintain the capability to disseminate publications and other EIA information products to the public and other users consistent with levels of program activity throughout EIA.

The Office of Statistical Standards provides coherent and credible strategies across EIA for information collection, analysis, and forecasting in the areas of survey and statistical design, development of processing and documentation standards, and coordination of standard definitions. The office manages the public-use forms clearance process and respondent burden control program within the DOE including preparation of the Department's annual Information Collection Budget. The Office also verifies the quality and meaningfulness of energy information and the processes used to collect, analyze, and forecast it. In carrying out those responsibilities, the Office processes DOE forms clearance packages, provides design review of data collection forms, reviews DOE information collection systems, and produces various reports which monitor burden upon the public resulting from DOE data collections. These reports are needed in preparing the annual DOE Information Collection Budget. The Office is also responsible for maintaining the Data Resources Directory and Public Use Data Tape, for preparing survey and sampling designs, for developing universe lists and sampling frames policies and methodologies, and for developing data collection standards and procedures. It has the further responsibility for evaluating data and analytical systems, and for archiving and inspecting the quality of data and forecasting systems.

The FY 1984 request for Statistical Standards is $248,000 and 25 FTE staff years. This amount excludes forms clearance and burden control work which is performed for FERC. These activities will be conducted on a reimbursable basis beginning in FY 1984.

The FY 1984 request for program direction in Program Services is $2,432,000, which will provide salaries, benefits, and travel for 58 FTE staff years to conduct the activities described above.

Anticipated Workload - Program Services

	FY 1982	FY 1983	FY 1984
Information Management Services - DOE			
Technical assistance responses	$ 8,600	$ 7,200	$ 7,700
Batch jobs processed	924,000	890,000	941,000
Interactive sessions supported	572,000	553,000	941,000
CPU hours supported	6,160	5,760	6,160
Validated users	2,200	2,100	2,100
Connect time (hours)	528,000	488,000	528,000
Lines printed	79,200,000	75,000,000	69,200,000
Information Management Services - FERC			
Technical assistance responses	1,200	1,200	1,200
Batch jobs processed	126,000	126,000	126,000
Interactive sessions supported	78,000	78,000	78,000
CPU hours supported	840	840	840
Validated users	300	300	300
Connect time (hours)	72,000	72,000	72,000
Lines printed	10,800,000	10,800,000	10,800,000
Energy Information Center			
Separate issues of publications written/edited/reviewed	371	300	300
Separate issues of publications disseminated	1,800,000	1,300,000	1,300,000
Inquiries handled	75,000	100,000	100,000
Documents, forms, and tables classified/indexed	5,700	4,000	4,000
Directories published	11	10	10
Publications microfiched	567	200	300
One time publications prepared	35	20	20
Fact sheets prepared	30	10	10
Statistical Standards - DOE			
Forms clearance packages processed	90	90	90
Public burden hours (adjusted) (All existing DOE components except FERC - In millions)	4.3	4.2	4.0
Information assessments performed	22	18	9
Reports reviewed	100	50	75
Surveys reviewed	20	10	15
Surveys designed	6	3	5
Major frame updated	3	0	2
Standards developed	20	0	5
Models archived	15	12	12
Forms Management Reports	60	45	45
Preparation and maintenance of annual information collection budget	1	1	1
Statistical Standards - FERC			
Forms clearance packages processed	70	65	65
Public burden hours (adjusted) (in millions)	7.4	4.5	4.5

Personnel Resources

Program Services is requesting funds to support 58 FTE staff years for FY 1984.

	FY 1982	FY 1983	FY 1984
Information Management Services	11	12	12
National Energy Information Center	32	21	21
Statistical Standards	52	25	25
Total, Program Services	95	58	58

The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

FY 1984 Congressional Budget Request

Key Activity Summary
Program Services

KEY ACTIVITIES	ESTIMATED ACTIVITY DURING FY 1983	PLANNED ACTIVITY DURING FY 1984
ADP computer support and attendant services.	Maintain IBM mainframe and peripheral equipment, adjust ADP user services to a level commensurate with reduced analytical requirements. Continue refinements to the hardware/software configuration, such as publications automation that reduce costs commensurate with reduced analytical, data and staffing levels. Manage approximately 65 major ADP contracts and process all related contract activities	Continue to maintain computer systems, services, and facilities management. Continue to to provide processing and operations support. Provide computer services to FERC on a reimbursable basis.
Information research management, and editorial services.	Basic information dissemination continues at reduced level commensurate with reductions in information produced by programs. Continue to consolidate publications into related families of publications.	Continue to provide information dissemination services to the public.
Printing and dissemination	Basic printing and dissemination functions continued; mailing lists continue to be updated.	Manage printing and dissemination of fewer number of consolidated publications.
Forms clearance and burden control.	Review forms clearance packages for submission to OMB. Conduct presurvey consultations with potential respondents and other interested groups. Design new or revised forms. Prepare and maintain the Information Collection Budget for the entire DOE. Prepare and maintain forms management and related reports.	Review forms clearance packages for submission to OMB, including FERC forms on a reimbursable basis. Conduct presurvey consultations with potential respondents. Design revised forms. Prepare and maintain the the Information Collection Budget for the entire DOE. Prepare and maintain forms management and related reports.
Maintenance of survey universe lists	Coordinate frames maintenance and some frames development.	Coordinate frames maintenance activities.
Maintenance of a Data Resources Directory (DRD)	Maintain current DRD.	Maintain current DRD.

Assess the quality of projections, data and systems.	Test data processing procedures; archive two short-term models; conduct limited number of special studies.	Monitor the projections produced by the short-term forecasting systems.
Develop statistical standards and methods.	Maintain data standards; maintain model documentation standards. Limited statistical monitoring of data.	Monitor some EIA statistical data for statistical accuracy and adherence to standards.

Energy Information Administration
Energy Information

(Tabular dollars in thousands. Narrative material in whole dollars).

	FY 1982 Appropriation	FY 1983 Appropriation	FY 1984 Base	FY 1984 Request
Policy and Management				
Operating Expenses:				
Program Direction.......	$1,833	$1,170	$1,242	$1,312
Program Support.........	6,150	5,073	5,073	5,353
Subtotal..............	7,983	6,243	6,315	6,665
Total, Policy and Management	$7,983	$6,243	$6,315	$6,665
Staffing FTP/FTE	40/46	30/31		30/31

Authorization: P.L.'s 75-688, 93-275, 93-319, 94-163, 94,385, 95-619, 95-620, 95-621, 96,294, 97,229, and 16 USC 791a et. seq.

Summary of Changes

FY 1983 Appropriation enacted.........................	$6,243
o FY 1983 Pay raise................................	+ 72
FY 1984 Base..	$6,315
Program Increases:	
o Impact in 1984 of within grade increases and other salary and expenses increases...............	+ 70
o Increased cost of GSA rent, utilities, supplies, equipment, training, and other administrative services for 480 employees.........................	+ 280
FY 1984 Budget Request..........................	$6,655

Policy and management provides resources for the central management, guidance, and coordination of all EIA activities. The Administrator is responsible for providing essential, relevant, and timely information to the Executive Branch, Congress, State Governments, and the public. The Administrator is also responsible for providing energy data, analysis, and processing support to other DOE components, and for preparation of regularly scheduled and special purpose energy forecasts and analyses, and for supporting departmental contingency planning and emergency operations. The Administrator is supported by a Deputy Administrator, and by an immediate staff, and the Office of Planning and Resources.

The Office of Planning and Resources manages overall EIA program planning and evaluation, project control, budgeting, procurement, performs organization and management analysis, and provides personnel management and logistical support services. The office also monitors and coordinates all GAO and Professional Audit Review Team activities, tracks legislation for energy information implications, prepares Congressional testimony, and handles the disclosure of sensitive company submitted information.

The FY 1984 budget request for Policy and Management is $6,655,000. Of this amount, $1,312,000 provides salary support for the Office of the Administrator and the Office of Planning and Resources, while $5,134,000 is budgeted for transfer to the Assistant Secretary for Management and Administration for GSA rent, heat, telephones, furniture, supplies, guard services, and other administrative support services. These support costs are budgeted at an average of $11,152 for each of the 480 FTE staff years authorized for the EIA in FY 1984.

Anticipated Workload - Policy and Management*

	FY 1982	FY 1983	FY 1984
Program Plans	1	1	1
Budgets	3	3	3
Financial Plans	12	12	12
Space plans, telephone, and other ad hoc requests	300	210	300
Travel requests	450	325	375
Printing requests	200	150	150
Correspondence tracked	600	600	600
Personnel actions and training requests processed	920	500	500
Contract actions processed	450	350	300

* Workload indicators do not take into account varying complexity factors; therefore, units of measurement are not necessarily comparable. For example, a contract involving the development or modification of a large system may involve extensive efforts to write specifications and requirements. A contract to purchase computer paper may be much simpler to execute. Each counts as one contract.

Personnel Resources

The 1984 request for Policy and Management includes funds to support 31 FTE staff years.

Total, Policy and Management	46	31	31

The FY 1983 and FY 1984 employment estimates assume enactment of legislation to repeal legislative employment requirements. Such legislation is being proposed with the budget. In the interim, the Department plans to comply with the legislative requirements regarding personnel levels.

FY 1984 Congressional Budget Request

Key Activity Summary
Policy and Management

KEY ACTIVITY	ESTIMATED ACTIVITY DURING FY 1983	PLANNED ACTIVITY DURING FY 1984
Provide central management guidance and coordination of all Energy Information activities.	Provide staff with guidance and management.	Provide staff with guidance and management.
Prepare program plans.	Develop program plans and Annual Operating Plan.	Develop program plans and Annual Operating Plan.
Prepare and execute budgets.	Prepare internal review budget, OMB budget, Congressional budget and related testimony and hearing material. Execute budget.	Prepare internal review budget, OMB budget, Congressional budget and related testimony and hearing material. Execute budget.
Manage contract program.	Process and monitor 350 contract actions.	Process and monitor 300 contract actions.
Administrative management.	Provides for space rental, utilities, communications, supplies, and other support services. Process personnel actions; space plans, and telephone, travel, printing and other administrative requests.	Provides for space rental, utilities, communications, supplies, and other support services. Process personnel actions; space plans; and telephone, travel, printing and other administrative requests.

Note on reimbursable work performed for other agencies: In a sense, everything that EIA produces is for some other agency or organization. EIA is not in the business of gathering data for its own sake. Everything is used by some other agency or by the Congress or the public. EIA was set up as an independent agency to ensure that no special interest or overriding concern could taint the data. However, other agencies occasionally have requirements which are above and beyond the normal scope of EIA's mission. These special requests, which occur generally on a one-time basis, are accommodated by reimbursement for contract costs incurred. At this time EIA knows of no such planned projects for FY 1984. However, EIA has traditionally budgeted for support to FERC. This year, for the first time, FERC is requesting funds for its information requirements. These funds will be transferred to EIA to perform those regulatory information functions that EIA has performed in the past. This reimbursable work, unlike most other reimbursable work, is regular, and is performed on a recurring basis.

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